The PHOTOFACT Servicer

SET 461 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ OCT., 1959

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This Servicer provides you with essential data on other models or special equipment not covered in standard PHOTOFACT folders. The schematics and supplementary data included here will be of valuable help to you in servicing this equipment.

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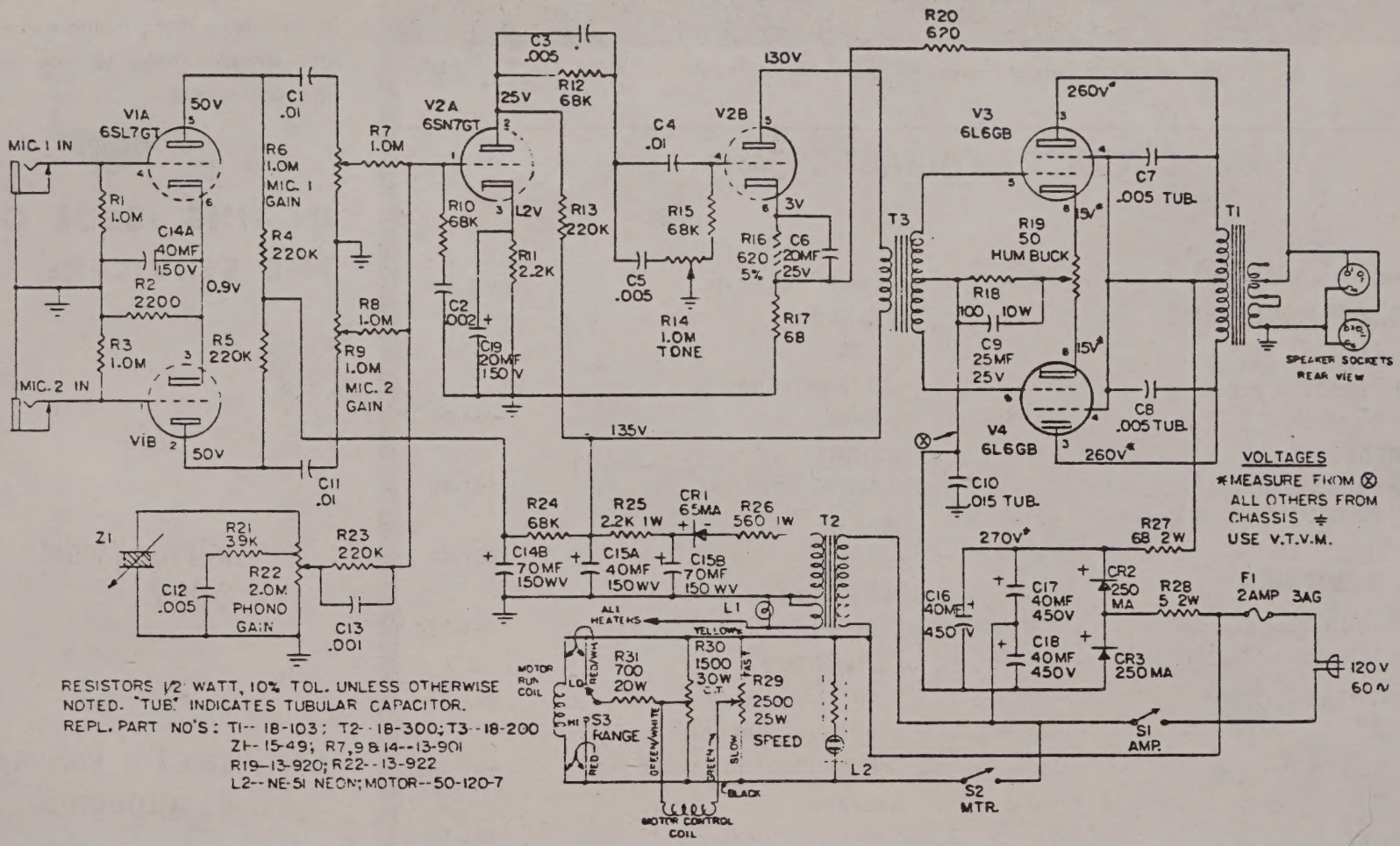
Califone Model 24V-7

Certificate For Volume Labels Vol. 41 through 50



RESISTORS 1/2 WATT, 10% TOL. UNLESS OTHERWISE NOTED. "TUB" INDICATES TUBULAR CAPACITOR.

REPL. PART NO'S: T1-- 18-103; T2--18-300; T3--18-200
Z1--15-49; R7,9 & 14--13-901
R19--13-920; R22--13-922
L2--NE-51 NEON; MOTOR--50-120-7

CALIFONE MODEL 24V-7

Schematic Diagram Courtesy of Califone Corp.

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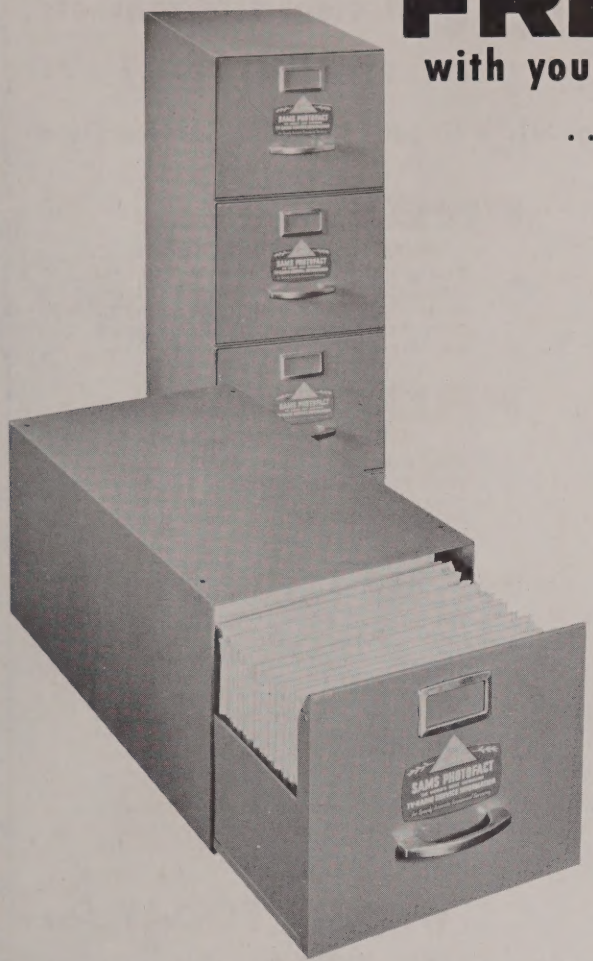
. . . world's finest TV-Radio Service Data



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No interest. No carrying charge. As little as $10 down. Up to 24 months to pay. And Howard W. Sams will give you *absolutely free* all the steel file cabinets you'll need for your Library: Single-Drawer File Cabinet worth $8.95 with your purchase of 60 Sets of PHOTOFACT Folders; Two single-drawer File Cabinets worth $17.90 with your purchase of 120 Sets; Three single-drawer File Cabinets worth $26.85 with your purchase of 180 Sets; Four single-drawer File Cabinets worth $35.80 with your purchase of 240 Sets.

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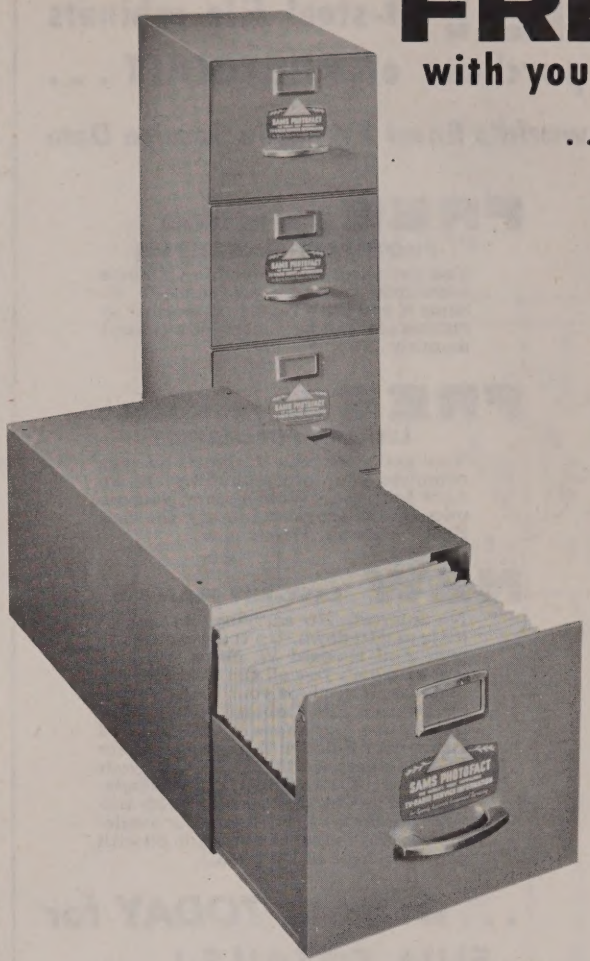
FILL OUT REVERSE SIDE COMPLETELY --- THEN MAIL TO-

HOWARD W. SAMS & CO., INC., 2201 E. 46th ST.,
INDIANAPOLIS 6, INDIANA



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PHOTOFACT CERTIFICATE VOLUME LABEL NOS. 41-50

(PLEASE PRINT)

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CITY _____

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MAIL TO - HOWARD W. SAMS & CO., INC., 2201 E. 46th ST.
INDIANAPOLIS 6, INDIANA

PHOTOFACT* Folder with CIRCUITRACE*

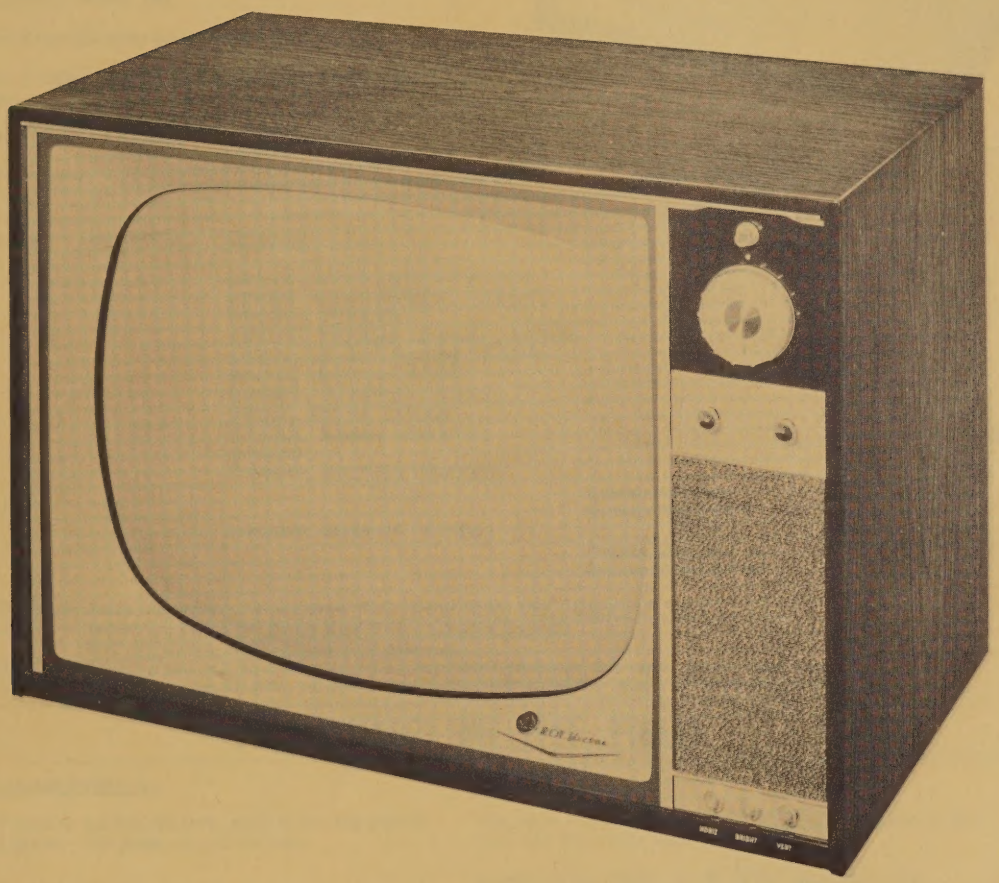
RCA VICTOR CHASSIS KCS128A, AA, AB, B, C, E, F, H, HX, J, JX, M, U, X, XU

IMPORTANT FILING NOTICE

The TV Folder for this envelope will be found among the first folders in this complete Set of folders.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

RCA VICTOR CHASSIS KCS128A, AA, AB, B, C, E, F, H, HX, J, JX, M, U, X, XU



MODEL 210T155 (Ch. KCS128A)

RCA VICTOR CHASSIS KCS128A, AA, AB, B, C, E, F, H, HX, J, JX, M, U, X, XU

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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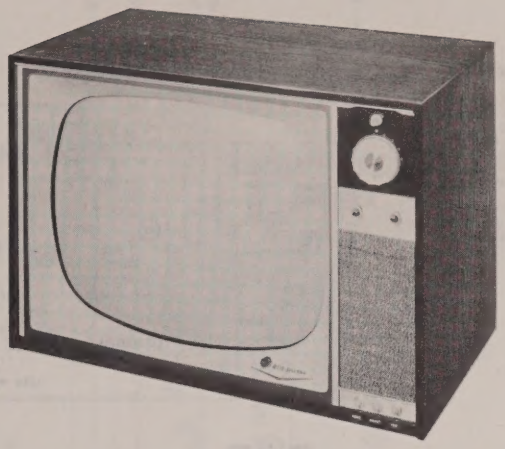
SET 461 FOLDER 1

RCA VICTOR CHASSIS KCS128A, AA, AB, B, C, E, F, H, HX, J, JX, M, U, X, XU

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL MODEL 210T155

1. Remove 5 spring clips holding the rear cover. Remove antenna connection. Remove rear cover.
2. Remove 7 push-on type knobs from the front.
3. Remove speaker leads, yoke plug, picture tube socket, and HV lead.
4. Remove 2 chassis brace screws, one near Contrast control, the other on HV can.
5. Remove 5 chassis bolts from bottom of cabinet.
6. Remove 2 metal screws holding the lower front control bracket.
7. Remove 4 nuts holding tuner mounting bracket.
8. Remove chassis.



MODEL 210T155 (Ch. KCS128A)

TRADE NAME	RCA Victor	MODELS	CHASSIS
		210T152, 210T155, 210T156, 210T157	KCS128A
		210K295, 210K296, 210K297, 210K299	KCS128AA
		210K295U, 210K297U	KCS128AB
		210T152U, 210T155U, 210T156U, 210T157U	KCS128B
		210K356, 210K357, 210K390, 210K394	KCS128C
		210K335, 210K336, 210K337	KCS128E
		210K335U, 210K336U, 210K337U	KCS128F
		210K415, 210K416, 210K417	KCS128H
		210K415X, 210416X, 210K417X	KCS128HX
		210K415U	KCS128J
		210KR455, 210KR456, 210KR457	KCS128M
		Remote Receiver	CTP9A
		Remote Transmitter	CRK3B
		210KR435, 210KR436, 210T212	KCS128U
		Remote Receiver	CTP8A
		Remote Transmitter	CRK4A

MANUFACTURER	Radio Corporation of America, RCA Victor Tele. Div., Camden 8, N.J.
TYPE SET	Television Receiver (Some Models with Remote Control)
TUBES	VHF-Seventeen, UHF-Eighteen or Nineteen
POWER SUPPLY	110-120 Volts AC, 60 Cycle RATING 190 Watts, 1.8 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

SERVICING IN THE FIELD

SAFETY GLASS REMOVAL

Remove 7 screws holding the trim strip at the top edge of the safety glass. Tilt glass out and remove.

FUSE

Two fuse wires are used for filament protection. (For location, see M1 and M2 in photo "Chassis Bottom View".)

FUSE DEVICE

A 12.5Ω fusible resistor (R82) is used for horizontal sweep circuit protection. (For location, see "Tube Placement Chart".)

TUNER OSCILLATOR ADJUSTMENT

To touch-up VHF Oscillator remove Channel Selector knob.

AGC

The AGC may be varied by means of an AGC control. (For location, see "Tube Placement Chart".)

FOCUS

The focus may be varied by means of a Focus control. (For location, see "Tube Placement Chart".)

HORIZONTAL OSCILLATOR FIELD ADJUSTMENTS

Coarse adjustment of the Horizontal Hold is accomplished by the proper setting of the Horizontal Stabilizing slug. (For location, see "Tube Placement Chart".)

WIDTH

The width may be varied by a Width coil. (For location, see "Tube Placement Chart".)

HORIZONTAL DRIVE

The horizontal drive may be varied by a Horizontal Drive trimmer. (For location, see "Tube Placement Chart".)

CENTERING

Centering is accomplished by 2 magnetic rings, located behind the yoke, on the neck of the picture tube.

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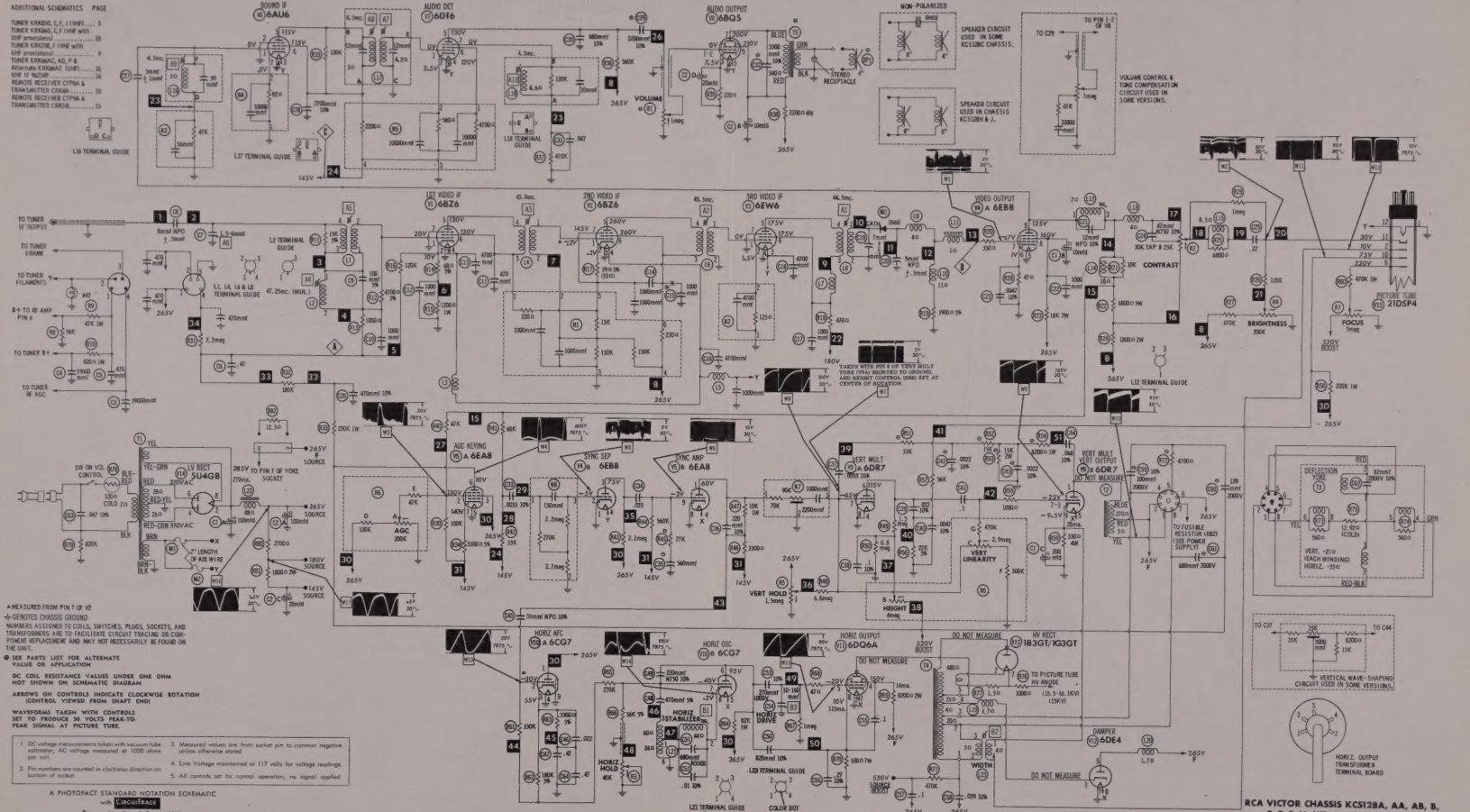
RCA VICTOR CHASSIS KCS128A, AA, AB, B, C, E, F, H, HX, J, JX, M, U, X, XU

SET 461 FOLDER 1


ADDITIONAL SCHEMATICS PAGE
TUNER KRK26D, E, F, I VHF.... 5
TUNER KRK26D, E, F VHF with UHF provisions).... 33
TUNER KRK70B, F VHF with UHF provisions).... 9
TUNER KRK86AC, AD, P & Alternate KRK86AC (UHF).... 35
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REMOTE RECEIVER CTP9A & TRANSMITTER CTK9A.... 10
REMOTE RECEIVER CTP9A & TRANSMITTER CTK10B.... 19
SOUND IF W 6AU6
AUDIO DET V7 6DT6
AUDIO OUTPUT W 6BQ5
NON-POLARIZED
SPEAKER CIRCUIT USED IN SOME KCS128C CHASSIS.
SPEAKER CIRCUIT USED IN CHASSIS KCS128H & J.
TO PIN 1-2 OF W1
TO C29
VOLUME CONTROL & TONE COMPENSATION CIRCUIT USED IN SOME VERSIONS.
VOLUME
STEREO RECEPTACLE
L36 TERMINAL GUIDE
L27 TERMINAL GUIDE
L28 TERMINAL GUIDE
1ST VIDEO IF V1 6BZ6
2ND VIDEO IF V2 6BZ6
3RD VIDEO IF V3 6EW6
VIDEO OUTPUT W 6EB8
CONTRAST
BRIGHTNESS
FOCUS
PICTURE TUBE 21DSP4
TO TUNER IF INPUT
TO TUNER C-BAND
TO TUNER FILAMENTS
B+ TO RF AMP PIN 6
TO TUNER B+
TO TUNER RF AGC
L1, L4, L6 & L8 TERMINAL GUIDE
L2 TERMINAL GUIDE
L32 TERMINAL GUIDE
TAKEN WITH PIN 6 OF VERT MULT TUBE (V9A) SHORTED TO GROUND, AND HEIGHT CONTROL (R68) SET AT CENTER OF ROTATION.
AGC KEYING V6 A 6EA8
SYNC SEP V6 B 6EB8
SYNC AMP V5 B 6EA8
VERT MULT V9 A 6DR7
VERT MULT VERT OUTPUT V8 B 6DR7 DO NOT MEASURE
VERT LINEARITY
VERT HOLD
HEIGHT
TO FUSIBLE RESISTOR (R82) (SEE POWER SUPPLY)
DEFLECTION YOKE
VERT. -21Ω (EACH WINDING) HORIZ. -25Ω
SW ON VOL CONTROL
LV RECT 5U4GB
285V 270mA
TO PIN 7 OF YOKE SOCKET
AGC 200K
HORIZ AFC V10 A 6CG7
HORIZ OSC V10 B 6CG7
HORIZ OUTPUT V11 6DQ6A
DO NOT MEASURE
HV RECT V12 1B3GT/1G3GT
TO PICTURE TUBE HV ANODE (15.5-16.5KV) (13KV)
HORIZ STABILIZER
HORIZ DRIVE
HORIZ HOLD
L23 TERMINAL GUIDE
L25 TERMINAL GUIDE
COLOR DOT
DAMPER V13 6DE4
WIDTH
VERTICAL WAVE-SHAPING CIRCUIT USED IN SOME VERSIONS.
HORIZ. OUTPUT TRANSFORMER TERMINAL BOARD
A MEASURED FROM PIN 7 OF V2
DENOTES CHASSIS GROUND
NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE.
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1000 ohms per volt.
2. Pin numbers are counted in clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line Voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.
A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE
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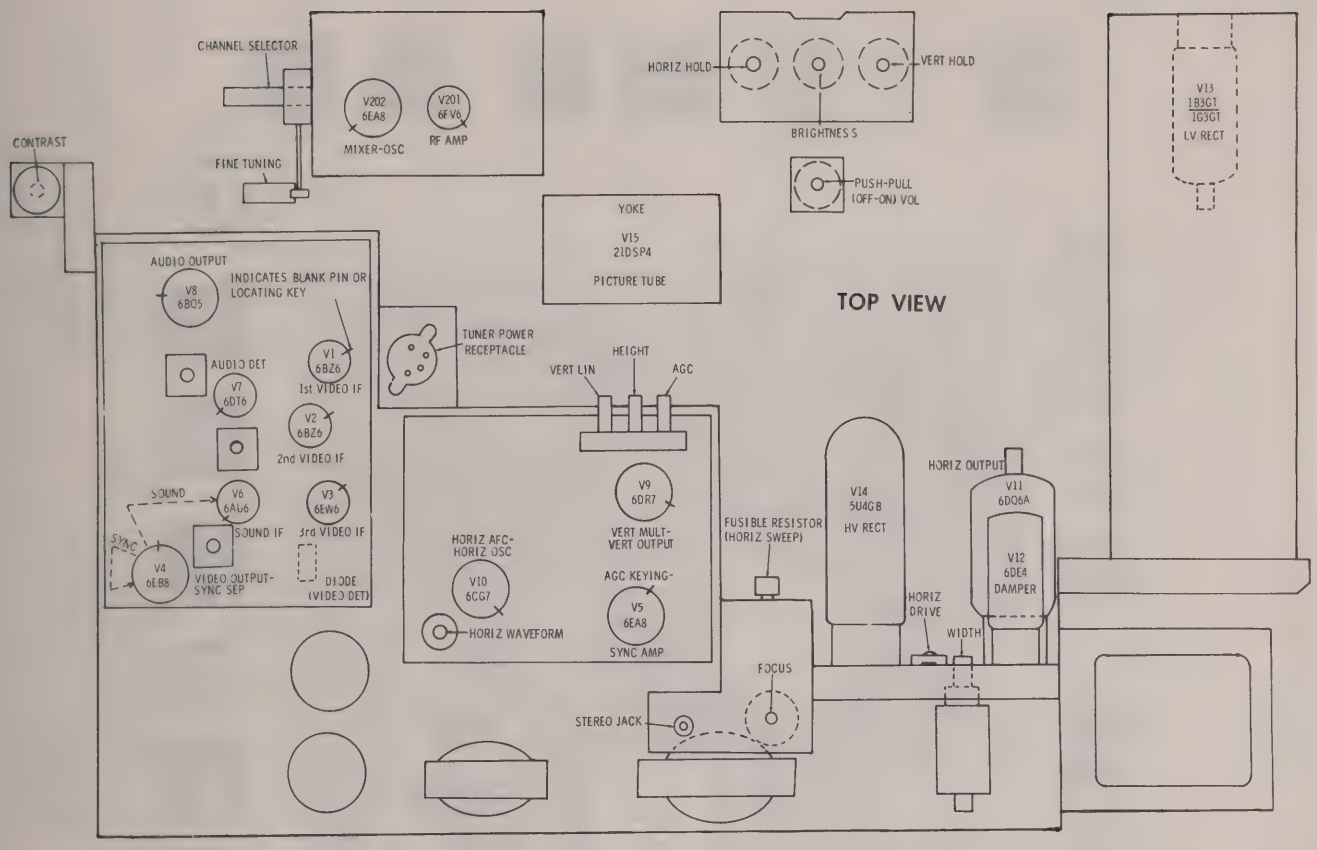
RCA VICTOR CHASSIS KCS128A, AA, AB, B, C, E, F, H, HX, J, JX, M, U, X, XU

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

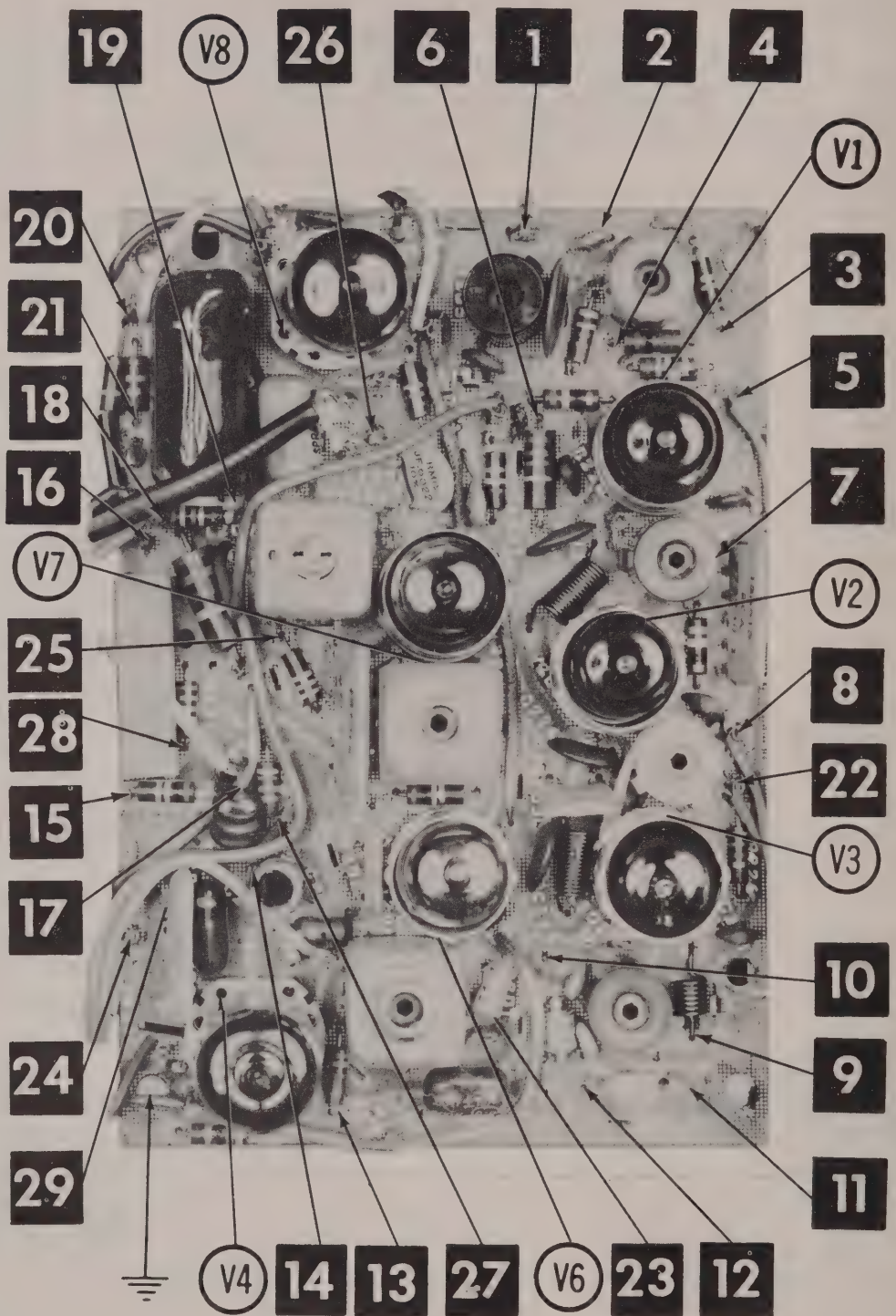
The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound V14, Fuse Wires (Filament)

SWEEP FAILURE
No raster, has sound Fusible Resistor (Horiz. Swp), V10, V11, V12, V13, V15, V14
No vertical deflection V9
Poor vert. linearity or foldover V9
Poor horiz. linearity or foldover V10, V11, V12
Narrow picture V14, V10, V11, V12
Vert. off freq. V9
Horiz. off freq. V10

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, V3, Diode (Video Det.), V4
No pic, no sound, has snow V201, V202, V1
No pic, has sound, has raster V4, V15
Has pic, no sound V6, V7, V8
Overloaded picture V5

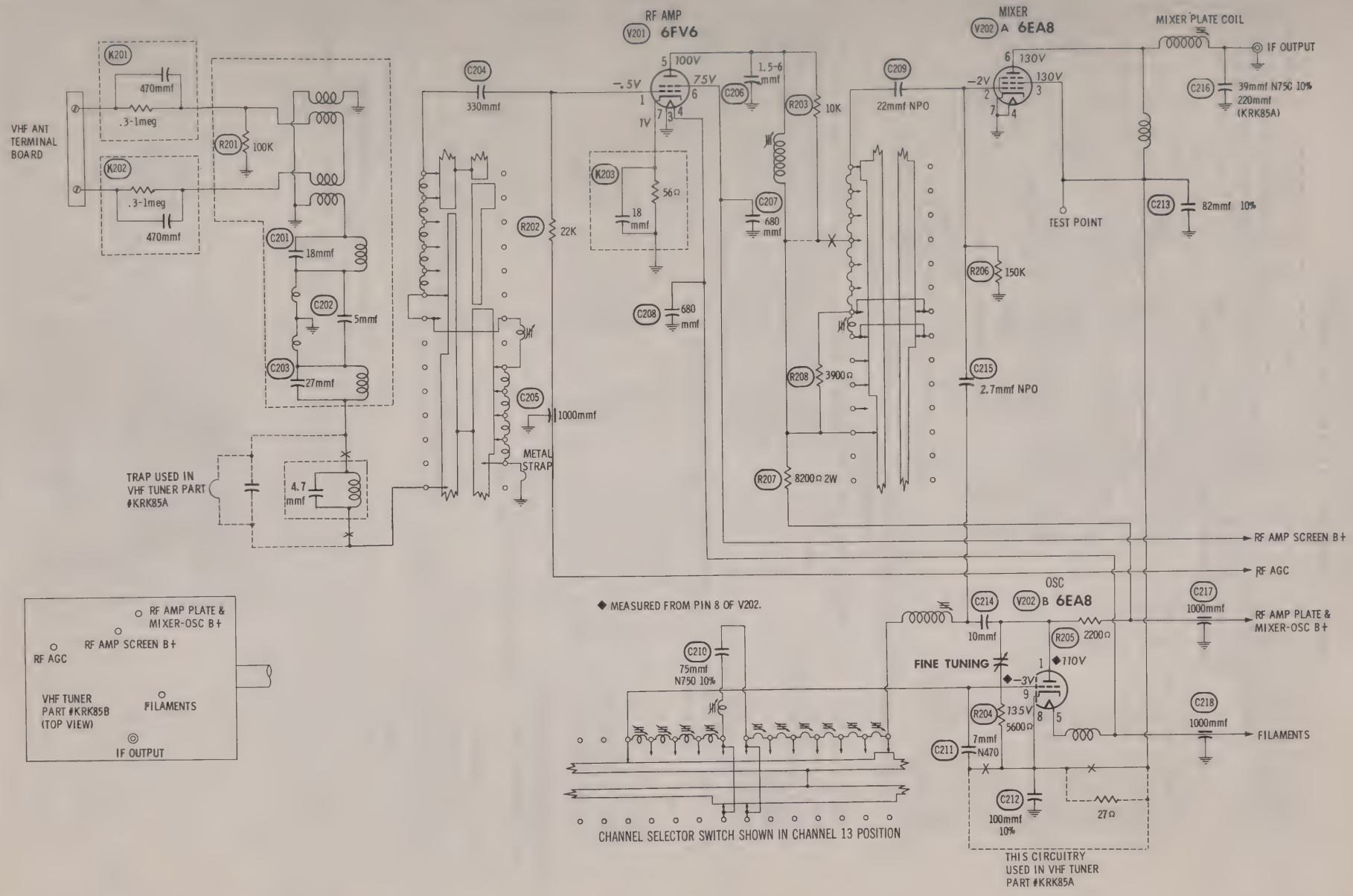
SYNC FAILURE
No vert. sync V9
No horiz. sync V10
No vert. or horiz. sync V4, V5



A Howard W. Sams CIRCUITRACE® Photo

MAIN
PRINTED BOARD

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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VHF TUNER KRK85D, E, F, J

RCA VICTOR CHASSIS KSC128A, AA, AB, B, C, E, F, H, HX, J, JX, M, U, X, XU

TUNER KRK85D,E,F,J

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V201	RF Amp.	6FV6	

ITEM No.	USE	TYPE	NOTES
V202	Mixer-Osc.	6EA8	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING			REPLACEMENT DATA						NOTES
	CAP.	VOLT	TOL	RCA Victor PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C201	18				DI-18	DD-180	L10Q18	CNO-418	5GA-Q18	
C202	5				NPO-DI 5	DD-050	L10V5	ZT-555	5GA-V5	
C203	27				DI-27	DD-270	L10Q27	CNO-427	5GA-Q27	
C204	330				BPD-00033	DD-331	L10T33	B-333	5GA-T33	
C205	1000				EF-001	MFT-1000			503C-D1	
C206	1.5-6					829-6		CT-552		
C207	680				BPD-00068	DD-681	L10T68	B-368	5GA-T68	
C208	680				BPD-00068	DD-681	L10T68	B-368	5GA-T68	
C209	22		NPO		NPO-DI 22	DTZ-22	C10Q22C	CNO-422	5TCC-Q22	
C210	75		N750 10%		N750-DI 75	DTN-75	C10Q75U		5TCU-Q75S 10%*	
C211	7		N470							
C212	100		10%		ADM-15-101 10% *	DD-101	22A5T1	CNO-310	MS-31	
C213	82		10%		ADM-15-820 10% *	DD-820	22A5Q82	CNO-482	MS-482	
C214	10				SI 10	DD-100	L10Q1	UC-541	5GA-Q1	
C215	2.7		NPO						5TCCB-V27S	
C216	39		N750 10%			TCN-39	C10Q39U	CN7-439	5TCU-Q39S 10% *	
C217	1000				EF-001	MFT-1000			503C-D1	
C218	1000				EF-001	MFT-1000			503C-D1	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		RCA Victor PART No.	NOTES
	OHMS	WATT		
R201	100K			
R202	22K			
R203	10K			
R204	5600Ω			

ITEM No.	RATING		RCA Victor PART No.	NOTES
	OHMS	WATT		
R205	2200Ω			
R206	150K			
R207	8200Ω	2		
R208	3900Ω			

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	RCA Victor PART No.	REPLACEMENT DATA	
K201	Antenna Isolation	470mmf, .3-1meg	104328	Centralab Sprague	RC-471 AC1-1
K202	Antenna Isolation	470mmf, .3-1meg	140328	Centralab Sprague	RC-471 AC1-1
K203	RF Cath. Bypass	18mmf, 56Ω			

PRE-ALIGNMENT INSTRUCTIONS

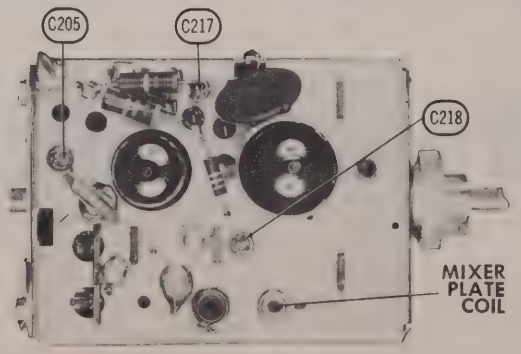
Suggested Alignment Tools: GENERAL CEMENT #8607, 9291
WALSCO #2520, 2522, 2523, 2524, 2537

OSCILLATOR ALIGNMENT

Set the Fine Tuning to the center of its range. Channel 13 slug is located on top of the tuner in front of the Oscillator tube. Channel 12 thru 2 adjustments are located on the front of the tuner in a circle around the shaft. The adjustments should be made in sequence from the highest to the lowest in the area. Channel 12 adjustment is located near top of tuner. Proceed in a counterclockwise direction adjusting for best picture and sound.

RF AND MIXER ALIGNMENT

This portion of the tuner has been properly aligned at the factory and is very stable. Alignment of this portion should not be attempted in the field.



TOP VIEW

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

The High Voltage lead should be securely taped and kept away from the chassis.
Disable the Horizontal Output circuit by connecting a 150Ω 10W resistor in series with the plate lead of the Horizontal Output tube. Connect the negative lead of a 12.5 volt bias supply from pin 5 (grid) of the Horizontal Output tube. Connect positive lead to chassis.
Suggested Alignment Tools: A1 thru A5, A7, A8, A9, All .... GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545
A6 ..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520
A10 ..... GENERAL CEMENT #8721, 8722
WALSCO #2519

VIDEO IF ALIGNMENT

Connect the negative lead of a 4 volt bias supply to point (A). Positive to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	1500mmf Ceramic Capacitor	High side to Mixer grid wafer contact thru access hole (adjacent to Mixer grid wafer) located in left side of tuner shield. Low side to chassis.	44.5MC (Unmod)	Any non-interfering channel	DC probe to point (B). Common to chassis. (Across Video Det. load).	A1	Adjust for maximum deflection. Adjust generator output for 3 volts on meter when finally peaked.
2.	"	"	45.5MC	"	"	A2	"
3.	"	"	43.0MC	"	"	A3	"
4.	"	"	47.25MC	"	"	A4	Adjust for MINIMUM deflection.

OVERALL VIDEO IF RESPONSE CHECK

Connect bias as under "Video IF Alignment".
Connect a 180Ω resistor from pin 5 (plate) to pin 6 (screen) of the 1st Video IF Amp.
Couple signal generator loosely to sweep output cable to provide markers.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	1500mmf Ceramic Capacitor	High side to Mixer grid wafer contact thru access hole (adjacent to Mixer grid wafer) located in left side of tuner shield. Low side to chassis.	45.0MC (10MC Swp)	42.5MC 45.75MC	4	Vert. Amp. thru demodulator probe to pin 5 (plate) of 1st Video IF Amp. Low side to chassis. Calibrate scope for 0.5 volts peak to peak.	A5, A6, & Mixer Plate Coil	Adjust Mixer Plate Coil and A5 for maximum gain, using A6 to obtain curve shape with markers as shown in Fig. 1. Remove 180Ω resistor.
6.	"	"	"	42.5MC 45.0MC 45.75MC	"	Vert. Amp. thru 10K to point (B). Low side to chassis. (Across Video Det. load). Calibrate scope for 5 volts peak to peak.	A1, A2, A3	Check for response similar to Fig. 2. If necessary, retouch A1, A2 and A3 for desired response.
7.	Fig. 3	High side thru pad (Fig. 3) to Mixer grid wafer contact thru access hole (adjacent to Mixer grid wafer) located in left side of tuner shield. Low side to chassis.	Not used	45.75MC	"	USE VTVM DC probe to point (B). Common to chassis.		Adjust generator output to provide exactly 1.5 volts on VTVM.
8.	1500mmf Ceramic Capacitor	Remove pad. High side to Mixer grid wafer contact thru access hole (adjacent to Mixer grid wafer) located in left side of tuner shield. Low side to chassis.	45.0MC (10MC Swp)	41.25MC	"	Leave VTVM connected. Connect scope as in step 6.	A1, A3	Retouch A1 and A3 for 1.0 to 1.5 volts on VTVM while maintaining response similar to Fig. 2.
9.	Fig. 4	Across antenna terminals thru matching network (Fig. 4).	Each VHF Channel in turn	42.5MC 45.75MC 47.25MC	All VHF Channels	Vert. Amp. thru 10K to point (B). Low side to chassis.	A1, A2	Check for response similar to Fig. 2. Retouch A1 and A2 SLIGHTLY to correct for tilt or other conditions that are approximately the same on all channels.

SOUND IF ALIGNMENT

Connect the negative lead of a 10 volt bias supply to point (A). Positive to chassis.
Set Contrast fully clockwise.
Set VTVM for negative voltage readings.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
10.	.001mfd	High side to point (B). Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe thru diode probe (Fig. 5) to pin 7 (grid 3) of Audio Detector. Common to chassis.	A7, A8, A9	Adjust for maximum negative voltage on meter. Attenuate generator for a reading between 1.0 and 1.5 volts on meter when finally peaked. Peak A7 and A8 with maximum core separation. Adjust A9 for maximum deflection.

11. Remove VTVM and diode probe. Connect scope across Volume control. Turn off signal generator and tune in the strongest TV station in the area and adjust Volume control for normal volume. Preset coil slug (A10) flush with the top of coil form. While observing scope and listening to the sound, adjust A10 clockwise to a peak. Continue turning clockwise to a second louder peak and adjust for maximum on this second peak.

ALIGNMENT INSTRUCTIONS (cont)

4.5MC TRAP ALIGNMENT

Set Contrast fully clockwise.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	.01mfd	High side to point (B). Low side to chassis.	4.5MC (400∿ Mod)	Any non-interfering channel	Vert. Amp. thru demodulator probe to cathode of picture tube. Low side to chassis.	All	Adjust for MINIMUM 400∿ indication on scope.

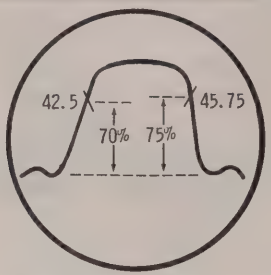


FIG. 1

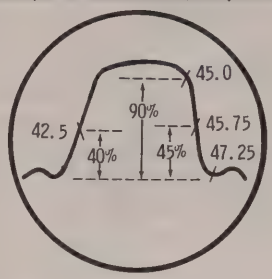


FIG. 2

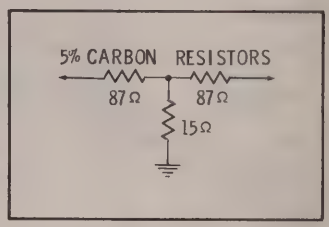


FIG. 3

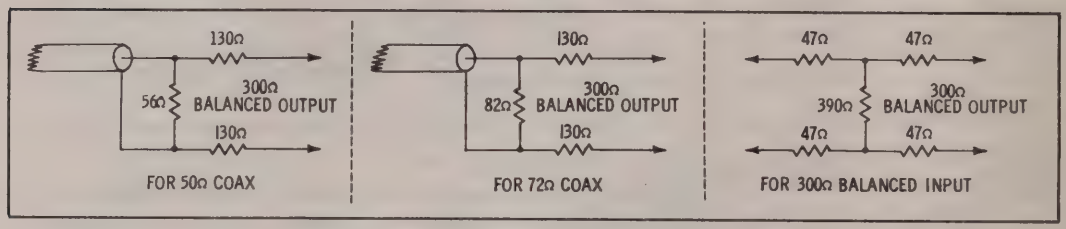


FIG. 4

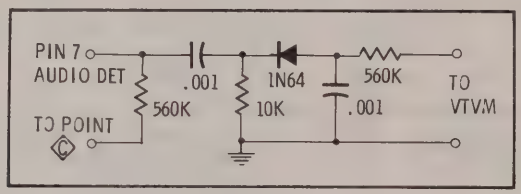
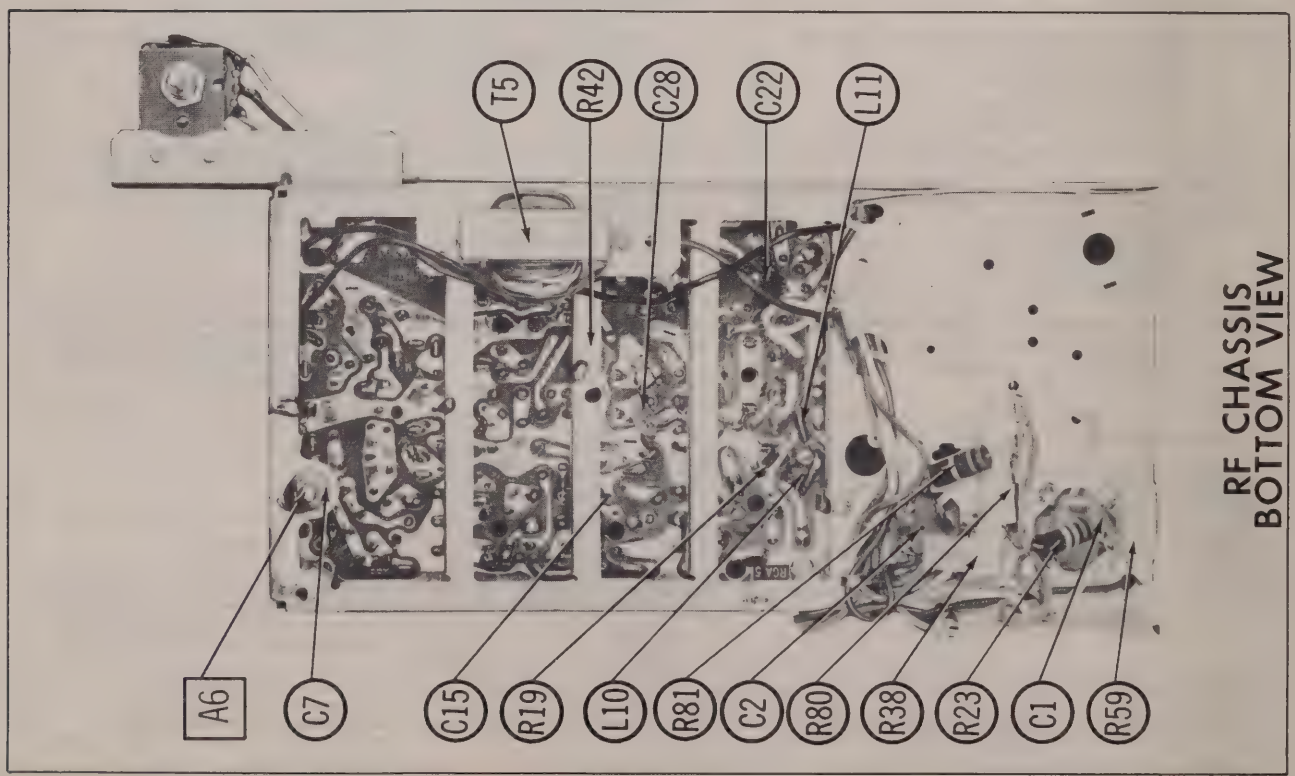


FIG. 5



VHF TUNER with UHF provisions KRK70E, F

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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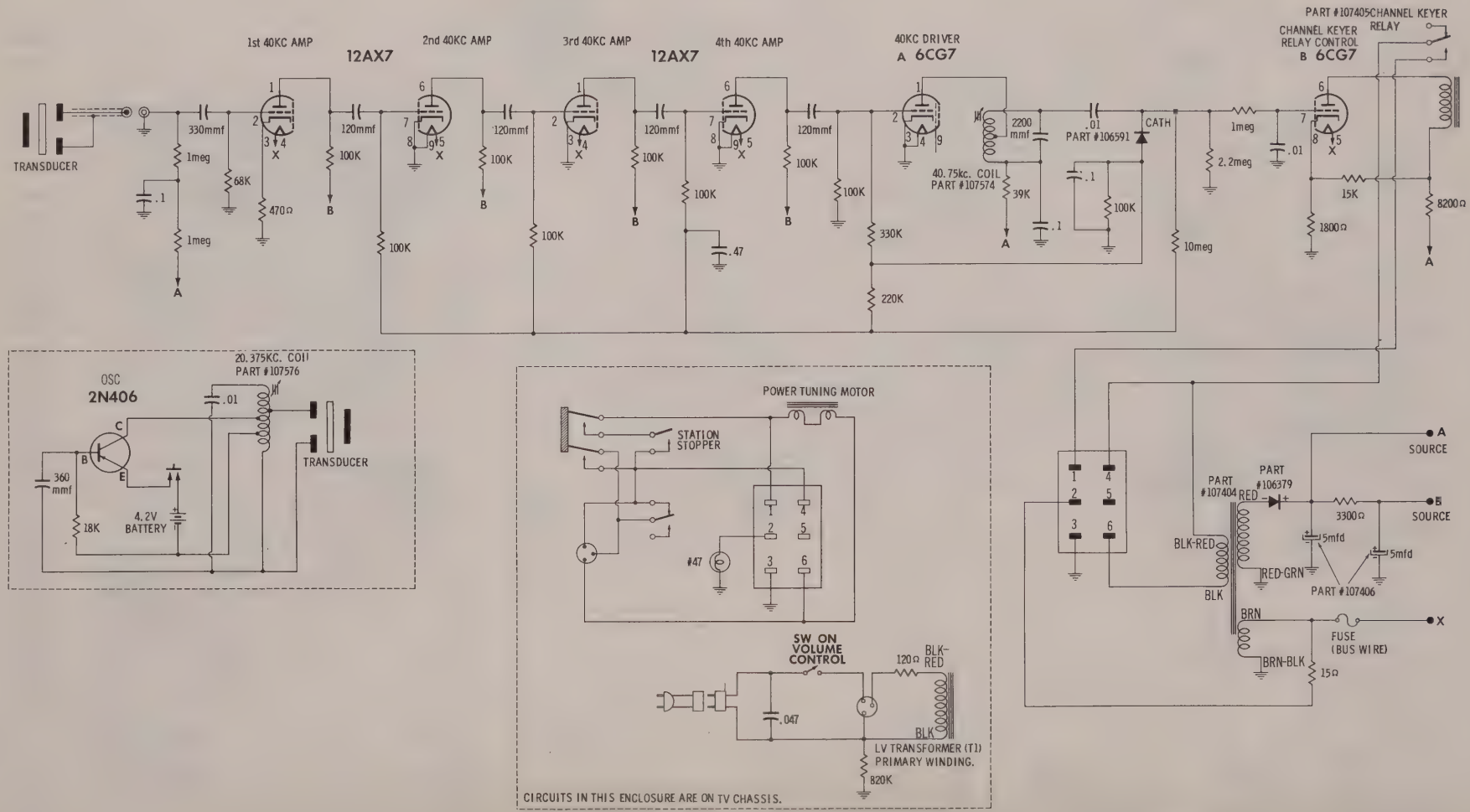

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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REMOTE RECEIVER CTP8A, TRANSMITTER CRK4A

PARTS LIST AND DESCRIPTIONS

TUBES

• CBS •	GENERAL ELECTRIC •	RAYTHEON •	SYLVANIA •

ITEM No.	USE	TYPE
V1	1st Video IF Amp.	6BZ6
V2	2nd Video IF Amp.	6BZ6
V3	3rd Video IF Amp.	6EW6
V4	Video Output-Sync Sep.	6EB8
V5	AGC Keying-Sync Amp.	6EA8
V6	Sound IF Amp.	6AU6
V7	Audio Det.	6DT6
V8	Audio Output	6BQ5
V9	Vert. Mult. -Vert. Output	6DR7
V10	Horiz. AFC-Horiz. Osc.	6CG7
V11	Horiz. Output	6DQ6A
V12	Damper	6DE4
V13	HV Rect.	1B3GT/ 1G3GT
V14	LV Rect.	5U4GB

PICTURE TUBE

ITEM No.	REPLACEMENT DATA					NOTES
	RCA Victor PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
V15	21DSP4		21DSP4 ①		21DSP4 ②	① Aluminized ② "Silver Screen 85"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	RCA Victor PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	▲100	400	107336	AFH3-174-25	C0894		TMT-186	TVL-3685	
B	■10	350			BR1505		TD-150-50	TVA-1311	
C	▲200	25							
C2A	▲100	400	102411	AFH4-103-40	D0805	FP421.3	TMQ-196	TVLS-4666.2*	
B	■10	400							
C	▲20	350							
D	20	50							

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING			REPLACEMENT DATA						NOTES
	CAP.	VOLT	TOL	RCA Victor PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C3	39000					DD-403	CUB6S4	GP140	5HK-S40	
C4	39000					DD-403	CUB6S4	GP140	5HK-S40	
C5	470				BPD-00047	DD-471	BYA10T47	B-347	5GA-T47	
C6	.47	200			P288N-47		CUB2P47	GEM-2047	2TM-P47	
C7	1.5-6			107177		829-6				
C8	8		NPO ±.5mmf	107594	NPO-DI8.2		C10V8C		10TCC-V8.2	
C9	100		5%	105300			22R5T1	MCE235	MS-31	
C10	1000			77252	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C11	470			78622	BPD-00047	DD-471	BYA10T47	B-347	5GA-T47	
C12	1000			77252	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C13	4700			73473	BPD-0047	DD-472	BYA10D47M	B-247	5HK-D47	
C14	1000			102234A	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C15	1000			102234A	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	①
C16	4700			73473	BPD-0047	DD-472	BYA10D47M	B-247	5HK-D47	
C17	1000			102234A	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C18	4700			73473	BPD-0047	DD-472	BYA10D47M	B-247	5HK-D47	
C19	7		±.5mmf	104177	NPO-DI 6.8	TCZ-6R8	C10V7C	CNO-568	10TCC-V6.8	
C20	5		NPO ±.5mmf	104178	NPO-DI 5.0	TCZ-4R7	C10V5C	CNO-547	10TCC-V50	
C21	12		NPO 10%	103245		TCZ-12	C10Q12C	CNO-412	10TCC-Q12	
C22	1000			102234A	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C23	.0047	600	10%		V84C6D47-10%		PM6D47	GP247	6TM-D47	
C24	47		N750 10%	102882	N750-DI 47	DTN-47	C10Q47C	CN7-447	10TCU-Q47	
C25	.22	600			P688N-22		CUB6P22	GEM-6022	6TM-P22	
C26	470		10%	102230	DI-470	DD-471	5R5T47	GP347	10TS-T47	
C27	3		±1mmf	104204	NPO-DI 3.0	TCZ-3R3	C10V3C	CNO-533	10TCC-V3.3	
C28	2700		10%	104131	DI-2700		PM6D3	GP227	10TS-D27	
C29	2200		10%	104899	DI-2200		1R5D22	GP222	10TS-D22	②
C30	680		10%	104135	DI-680	DD-681	1R5T68	GP368	10TS-T68	
C31	.047	200			P288N-047	DF-503	CUB2S47	GEM-4147	2TM-S47	
C32	3300		10%	104208	DI-3300		1R5D33	GP233	10TS-D33	③
C33	.0033	600	10%		V84C6D33-10%		PM6D33	GP233	6TM-D33	
C34	.033	400			P488N-033		CUB4S33	GEM-4133	4TM-S33	
C35	560				DI-560	DD-561	L10T56	B-356	5GA-T56	④
C36	220		10%	104144	1468-00022K	DD-221	22R5T22	MCB237	MS-322	
C37	.0033	600	10%		V84C6D33-10%		PM6D33	GP233	6TM-D33	
C38	.1	600	10%		V84C6P1-10%		PM6P1		6TM-P1	
C39	.022	600	10%		V84C6S22-10%		PM6S22		6TM-S22	
C40	.0047	600	10%		V84C6D47-10%		PM6D47	GP247	6TM-D47	
C41	.1	600			P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C42	.0022	600	10%		V84C6D22-10%		PM6D22	GP222	6TM-D22	⑤
C43	.0022	600	10%		V84C6D22-10%		PM6D22	GP222	6TM-D22	⑤
C44	.068	400	10%		P488N-068		PM4S68		4TM-S68	
C45	33		NPO 10%	105348	NPO-DI 33		C10Q33C	CNO-433	10TCC-Q33	
C46	.022	200			P288N-022		CUB4S22	GEM-4122	4TM-S22	
C47	.47	200			P288N-47		CUB2P47	GEM-2047	2TM-P47	
C48	470		5%	105672	1468-00047J		22R5T47	MCJ244	MS-347	
C49	220		N750 10%	105245	N750-DI 220	DTN-220	C10T22U	CN7-322	10TCU-T22	
C50	820		10%	106080	1468-00082K	DD-821	1R5T82	MCB251	MS-382	
C51	680		N3300	105518						
C52	.01	400	10%		V84C4S1-10%		PM4S1	GP110	4TM-S1	
C53	270	1000	10%	107323	DI-270	DD-271		GP327	10TS-T27	
C54	10-160			100849						
C55	.1	600			P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C56	.27	600	10%				PM6P25		6TM-P25	
C57	.1	400			P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP	RATING VOLT	RATING TOL	REPLACEMENT DATA RCA Victor PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C58	.039	600	10%		P84UM-.039		PM634	GEM-1614 3DY-310	6TM-S4	B
C59	100	2000	10%			DD30-121	HVB20T12	2HV-313	30GA-T12	B
C60	120	2000			HVD-30-680	DD30-681	HVB20T68	2HV-309 3DY-682	30GA-T68	B
C61	680	2000								B
C62	.02	2000	10%		V84C6547-10%		PM6947		6TM-S47	
C63	.047	600	10%		P2889N-47		CUB2P47	GEM-2047	2TM-P47	
C64	.47	200								

1 Not used in some versions.
Ch. KCS-138C, D, E, F use 1000mmf 10% in this application (Part #102334A)
Ch. KCS-138C, D, E, F use 4700mmf 10% in this application.
Some versions may use a component combination in this application (Part #107492)
Some versions may use a component combination in this application (Part #107282).
Some versions may use a component combination in this application (Part #107543).

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA RCA Victor PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No	MALLORY PART No	INSTALLATION NOTES
R1A	1meg	½	107388				PP18A	Volume, Note 1
B	Shaft						DS-37	
C	Switch						Not Req.	Push-Pull Off-On
R2	30K	½	107330					Contrast, Tap ⑤ 25K
R3	40K	½	107333					Horiz Hold
R4A	200K	½	107331	AB-46	A47-200K-S	QII-129	U43	Brightness
B	Shaft			AK-8	RS-3/16	NQ	DS-37	
R5A	1 Smeg	½	107332	AB-742	A47-1 Smeg-S	QII-138	U155	Vert Hold
B	Shaft			AK-8	RS-3/16	NQ	DS-37	
R6A	200K	.2	107396					AGC
B	4meg	2						Height
C	2.5meg	3						Vert. Lin.
D	100K							AGC B+ Coupling
E	47K							AGC Grid Coupling
F	300K							Vert. Lin. Limiter
G	470K							Video Output Grid
R7A	5meg	½	107384	AB-87	B47-5meg-S	BII-141	PTA56L	Focus
B	Shaft			AK-19	Not Req.	TM-4	Not Req.	

Note 1. Ch. KCS128AA, AB, C, D use Volume with Switch (Part #107446).
Ch. KCS128E, F, H, HX, J, JX, U use Volume with Switch (Part #107534).

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R8	56K	
R9	47K 1W	
R10	6200 1W	
R11	15K 5%	
R12	4700Ω 5%	
R13	1000Ω	
R14	68Ω 5%	
R15	1200Ω 1W	
R16	120K	
R17	1Ω 5%	(33Ω 5%) *
R18	470Ω	
R19	3900Ω 5%	
R20	330Ω	
R21	10K	
R22	6800Ω 5W	
R23	18K 2W	
R24	1800Ω 2W	
R25	680Ω	
R26	120K	
R27	470K	
R28	47Ω	
R29	1meg	
R30	100K	
R31	2.2meg	
R32	180K	

ITEM No.	RATING	REMARKS
R33	220K 1W	
R34	33000Ω 5%	
R35	100K	
R36	560K	
R37	470K	
R38	22000Ω 4W	
R39	220Ω	
R40	47K	
R41	68K	
R42	33K	
R43	2.2meg	
R44	560K	R69
R45	27K	Note 1
R46	3300Ω	
R47	10K 1W	
R48	6.8meg	
R49	1.5meg	
R50	6.8meg	
R51	33K	Note 2
R52	15K	Note 2
R53	15K 2W	Note 2
R54	8200Ω 1W	Note 2
R55	1000Ω	
R56	22K 5%	
R57	56K	

ITEM No.	RATING	REMARKS
R58	330K 1W	
R59	3300Ω 4W	
R60	470K 1W	
R61	330K	
R62	180K 5%	
R63	33000Ω 5%	
R64	82K 1W	
R65	270K	
R66	56K 5%	
R67	1meg	
R68	47Ω	
R69	8200Ω 3W	
R70	100Ω 7W	
R71	470K	
R72	4700Ω	Note 3
R73	560Ω	
R74	560Ω	
R75	12.82Ω Cold	#107420
R76	1000Ω	
R77	1.5Ω	
R78	1200Ω Cold	#107191
R79	820K	
R80	2700Ω	
R81	18000Ω 2W	
R82	12.5Ω	#104295

* Alternate value.
① Some versions may use a component combination (Part #107492).
② Some versions may use a component combination (Part #107282).
③ Some versions may use a component combination (Part #107543).

COILS (RF-IF)

ITEM No	USE	REPLACEMENT DATA RCA Victor PART No.	Gramer PART No	Messner PART No	Merit PART No	Miller PART No.	Ram PART No	NOTES
L1	1st Video IF	107202						
L2	47.25MC Trap	107203						
L3	FU Choke							
L4	2nd Video IF	104233						
L5	FU Choke							
L6	3rd Video IF	107204						
L7	RF Choke							
L8	4th Video IF	104233						
L9	Series Peaking Coil	101819	19-3036	19-3036	TV-180	6176	VP-1	36uh
L10	Shunt Peaking Coil	101287	19-3350	19-3350	TV-185	6181	VP-6	250uh
L11	RF Choke	107463			SW-630			2.7uh
L12	4.5MC Trap	104903						
L13	Shunt Peaking Coil	101819	19-3036	19-3036	TV-180	6176	VP-1	36uh
L14	Series Peaking Coil	107199			TV-307	6156		750uh
L15	Series Peaking Coil	104230	19-3300	19-3300	TV-199	6155		300uh
L16	1st Sound IF	104126						
L17	2nd Sound IF	107201						
L18	Quadrature Coil	106795						
L19	RF Choke	107385	19-1009	19-1009		4611		8.2uh
L20	RF Choke	107385	19-1009	19-1009		4611		8.2uh

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES PRI	DC RES SEC	REPLACEMENT DATA RCA Victor PART No	Halldorson PART No	Merit PART No	Miller PART No	Ram PART No	Thordarson PART No	NOTES
L21A	84Ω		107284						Horiz. Osc. tapped @ 24Ω
B	44Ω								Horiz Stabilizer

FILTER CHOKE

ITEM No	RATINGS CURRENT (Measured)	RATINGS DC RES	RATINGS INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA RCA Victor PART No	Halldorson PART No	Merit PART No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No
L22	270A	48Ω	9 Hy	100286	26C44				26C44	C-28X

COILS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA RCA Victor PART No	Halldorson PART No.	Merit PART No	Miller PART No.	Ram PART No	Rogers PART No	Stancor PART No	Thordarson PART No	Triad PART No
L23	Width Coil	107337								
A	Prt. (2 5-16MH)									
B	Sec (1-.2MH)									

TRANSFORMER (POWER)

ITEM No	RATING PRI	RATING SEC 1	RATING SEC 2	REPLACEMENT DATA RCA Victor PART No	Halldorson PART No	Merit PART No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No
T1	117V ② 1.8A	820VCT ③ .270A	5V ④ 3A	107382						
	SEC 3	SEC 4	SEC 5							
	6.3V & 8.7A									

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA RCA Victor PART No.	Halldorson PART No.	Merit PART No	Ram PART No	Rogers PART No	Stancor PART No	Thordarson PART No	Triad PART No
T2	Vert. Output	107338	26873	A-3854	V307①	Vc34①	VO-100 ②	26873	A-118X ③
T3	Yoke-Horiz. (18MH) (80°)-Vert. (38MH)	107608	Y-25 ④	MDF-98④	Y80F10/43 PCM3045	DY-33A④	Y-25 ④	Y-43 & NW-4 ④	
	Centering Device				④⑤	④⑤			
T4	Horiz. Output	107422	FLY-150 ⑦ *	HVO-116 ⑦ *	X86 ⑦ *		HO-289 ⑦ *	FLY-150 ⑦ *	D-139 ⑦ *

① Connect as autoformer.
② Cut and tape red and yellow lead.
③ Use 8 to 1 turns ratio.
④ Requires new rear cover, centering device, and yoke clamping device.
⑤ Connect horizontal yoke damping capacitor across yoke terminals #3 and #7. Connect yoke #3 to plug pin #4, yoke #2 and #7 to plug #5, yoke #1 to plug #3.
⑥ Connect same as original.
⑦ Drill new mounting hole(s).

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

	ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	Ram Replacement Connections	Rogers Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
	5	5	5	5		5	5	5
	4	4	4	4		4	4	4
	3	3	3	3		3	3	3
	2	2	2	2		2	2	2
	1	1	1	1		1	1	1
Connect Width Coil Across	2 & 1	2 & 1	2 & 1	2 & 1		2 & 1	2 & 1	2 & 1

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI	IMPEDANCE SEC	REPLACEMENT DATA RCA Victor PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No	Triad PART No	NOTES
T5	7500Ω	3-4Ω	104193 ①	24852	A-2931	A-3878	24S52	S-7X	① Used in Ch. KCS128A, B.
	7600Ω	3-4Ω	100037 ②	26848	A-3020	AU-604	26848	S-9Z	② Used in all chassis except KCS128A, B.

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V C IMP	REPLACEMENT DATA RCA Victor PART No	REPLACEMENT DATA QUAM PART No	NOTES
SP1	4"	PM	3-4Ω	107474 ①	4A1	① Models 210K356, 7, 210KR435, 6, 210T152, 5, 8, 7, & U.
	4" x 6"	PM		107476 ②		② Model 210TR212.
	6" x 9"	PM	3-4Ω	107304 ③	69A3	③ Models 210K295, U, 210K296, 210K297, U, 210K299.
	6" x 9"	PM		107708 ④		④ Models 210KR455, 6, 7
	8"	PM		107475 ⑤		⑤ Models 210K335, 6, 7, & U, 210K356, 7, 210K390, 4.
	8	PM		107526 ⑥		⑥ Models 210K415, U, & 210K416, 7.

COMPONENT COMBINATIONS

ITEM No	USE	DESCRIPTION	RCA Victor PART No	REPLACEMENT DATA
K1	Video IF Decoupling	1000mmf, 1000mmf, 220Ω, 220Ω, 15K, 150K, 150K	107277	
K2	Video IF Cathode	470mmf 125Ω	107279	
K3	Sound IF Grid	56mmf 47K	104229	Sprague PRC-1 Centralab HC-421
K4	Sound IF Cathode	10000mmf, 82Ω	107278	Sprague PRC-18
K5	Sound IF Decoupling	10000mmf, 10000mmf, 560Ω, 22Ωx, 470Ω	107276	Sprague ST-12
K6	Sync Grid Coupling	150mmf, 270K, 2.2meg, 2.7meg	107290	
K7	Vert. Integrator	1000mmf, 2200mmf, 70K, 90K	107281	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA RCA Victor PART No. FUSE	RCA Victor PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	2" Length #28 Wire							
M2	2" Length #28 Wire							

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA RCA Victor PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No	NOTES
M3	1N60	7067SB	1N60	1N60	1N60	Video Detector (Pigtail)

MISCELLANEOUS

ITEM No	PART NAME	RCA Victor PART No.	NOTES
M4	Tuner	KRK85D	VHF Ch. KCS128A, AA, C
	Tuner	KRK85E	VHF Ch. KCS128M
	Tuner	KRK85F	VHF Ch. KCS128E, HX
	Tuner	KRK85J	VHF Ch. KCS128U
	Tuner	KRK88D	VHF with UHF provisions Ch. KCS128AB, B
	Tuner	KRK70F	VHF with UHF provisions Ch. KCS128H, J
	Tuner	KRK88F	VHF with UHF provisions Ch. KCS128F, JX
	Tuner	KRK99AC	UHF Ch. KCS128D, F, JX
	Tuner	KRK88AD	UHF Ch. KCS128J
	UHF IF	983249	Ch. KCS128J
	Printed Board	107345	Main, Less Tubes, Ch. KCS128A, B
	Printed Board	107346	Main, Less Tubes, Ch. KCS128AA, AB, C, D, E, F, H, J, M, U, HX, JX
	Printed Board	107348	Sweep, Less Tubes

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Safety Glass	107497	Models 210K296, U, 6, 7, U, 9, 210K356, 7, 210K390, 4, 210KR435, 6, 210KR455, 6, 7
Safety Glass	107427	Models 210K335, 6, 7, & U
Safety Glass	107515	Models 210K415, U, 6, 7
Safety Glass	106275	Models 210T152, 5, 6, 7 & U, 210TR12
Mask	107671	Models 210K295, U, 6, 9
Mask	107672	Models 210K297, U
Mask	107426	Models 210K335, 6, 7 & U
Mask	107530	Models 210K356, 210K390, 210KR435, 6, 210KR455, 6
Mask	107519	Models 210K357, 210K394, 210KR457
Mask	107688	Models 210K415, U, 6, 7
Mask	106464	Models 210T153, 5, 6, 7, & U
Mask	107578	Model 210TR212
Knob	106286	VHF Channel Selector, Models 210K399, 210K394
Knob	106099	VHF Channel Selector, Models 210K297, U, 210K357
Knob	106098	VHF Channel Selector, Models 210K295, U, 210K390
Knob	107481	VHF Channel Selector, Models 210K296, 210K356
Knob	107373	VHF Channel Selector & Dial Assy., Models 210K335, 6, 7, & U 210K415, U, 6, 7, 210KR435, 6, 210KR455, 6, 7, 210TR212
Knob	107344	VHF Channel Selector, Models 210T152, 5, 6, 7, & U
Knob	102576	UHF Channel Selector, Model 210K397U
Knob	102653	UHF Channel Selector, Model 210K399U
Knob	107263	Fine Tuning, Models 210K335, 6, 7 & U, 210K415, U, 6, 7, 210T152, 5, 6, 7 & U
Knob	106596	Fine Tuning, Models 210KR435, 6, 210KR455, 6, 7, 210TR12

PARTS LIST AND DESCRIPTIONS (Continued)

CABINETS & CABINET PARTS (cont)

NAME	PART NO.	DESCRIPTION
Knob	107486	Fine Tuning, Models 210K297, U, 210K317, U, 210K357
Knob	107669	Fine Tuning, Models 210K299, 210K394
Knob	107485	Fine Tuning, Models 210K295, U, 210K390
Knob	107487	Fine Tuning, Models 210K296, 210K356
Knob	107266	UHF Dial, Models 210K335U, 6U, 7U, 210K415U, 210T152U, 5U, 6U, 7U
Knob	106103	UHF Dial, Model 210K297U
Knob	106102	UHF Dial, Model 210K295U
Knob	107269	UHF Dial, Models 210K335U, 6U, 7U, 210K415U, 210T152U, 5U, 6U, 7U
Knob	107264	Off-On-Volume, Contrast, Models 210K335, 6, 7 & U, 210K415, 5U, 6, 7, 210T152, 5, 6, 7 & U, 210KR435, 6, 210TR212
Knob	107343	Off-On-Volume, Contrast, Models 210KR435, 6
Knob	107656	Off-On-Volume, Contrast, Models 210K299, 210K394
Knob	107483	Off-On-Volume, Contrast, Models 210K297, U, 210K357
Knob	107482	Off-On-Volume, Contrast, Models 210K295, U, 210K390
Knob	107484	Off-On-Volume, Contrast, Models 210K296, 210K356
Knob	107488	Brightness, Models 210K295, U, 6, 7, U, 9, 210K356, 7, 210K390, 4, 210K415, U, 6, 7, 210KR435, 6, 210KR455, 6, 7
Knob	107265	Brightness, Vertical, Horizontal, Models 210K335, 6, 7, & U, 210T152, 5, 6, 7 & U, 210TR212
Knob	107490	Vertical, Models 210K295, U, 6, 7, U, 9, 210K356, 7, 210K390, 4, 210K415, U, 6, 7, 210KR435, 6, 210KR455, 6, 7
Knob	107489	Horizontal, Models 210K295, U, 6, 7, U, 9, 210K356, 7, 210K390, 4 210K415, U, 6, 7, 210KR435, 6, 210KR455, 6, 7
Escutcheon	107424	Cabinet Front, Models 210K335, 6, 7 & U
Escutcheon	106512	Fine Tuning, Models 210K435, 6, 210KR455, 6, 7, 210TR212
Cabinet	X4623	Models 210K295, U
Cabinet	X4624	Model 210K296
Cabinet	X4625	Models 210K297, U
Cabinet	M4586	Models 210K335, U
Cabinet	M4587	Models 210K336, U
Cabinet	M4588	Models 210K337, U
Cabinet	M4584	Model 210K356
Cabinet	M4585	Model 210K357
Cabinet	X4643	Model 210K390
Cabinet	X4644	Model 210K394
Cabinet	X4589	Models 210K415, U
Cabinet	X4590	Model 210K416
Cabinet	X4591	Model 210K417
Cabinet	M4635	Model 210KR435
Cabinet	M4636	Model 210KR436
Cabinet	M4637	Model 210KR455
Cabinet	M4638	Model 210KR456
Cabinet	M4639	Model 210KR457
Cabinet	Z4561	Models 210T152, U
Cabinet	Z4562	Models 210T155, U
Cabinet	Z4563	Models 210T156, U
Cabinet	Z4564	Models 210T157, U
Cabinet	Z4596	Model 210TR212
Base	X5112	Cabinet Swivel, Less Legs, Model 210K416
Leg	Y7038	Cabinet, Models 210K335, U
Leg	Y7044	Cabinet, Models 210K336, U
Leg	Y7039	Cabinet, Models 210K337, U
Leg	X5080	Cabinet, Model 210K356
Leg	X5081	Cabinet, Model 210K357
Leg	X5120	Cabinet, Models 210K315, U
Leg	X5121	Cabinet, Model 210K316
Leg	X5122	Cabinet, Models 210K317, U
Leg	X5123	Cabinet, Model 210K319
Leg	Y7029	Cabinet, Models 210K295, U
Leg	Y7030	Cabinet, Model 210K296
Leg	Y7045	Cabinet, Models 210K297, U
Leg	Y7085	Cabinet, Model 210K299
Leg	X5124	Cabinet, Models 210K295, U
Leg	X5125	Cabinet, Model 210K296
Leg	X5126	Cabinet, Models 210K297, U
Leg	X5127	Cabinet, Model 210K299

WIRING DATA

High Voltage Lead	Use BELDEN No.	8869
Shielded Hook-up Wire	Use BELDEN No.	8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No.	8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No.	8874
300Ω Tuner Input Lead	Use BELDEN No.	8225
300Ω Antenna Lead-in	Use BELDEN No.	8230 or 8275
Antenna Rotor Cable	Use BELDEN No.	8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor

REMOTE RECEIVER CTP9A, TRANSMITTER CRK3B

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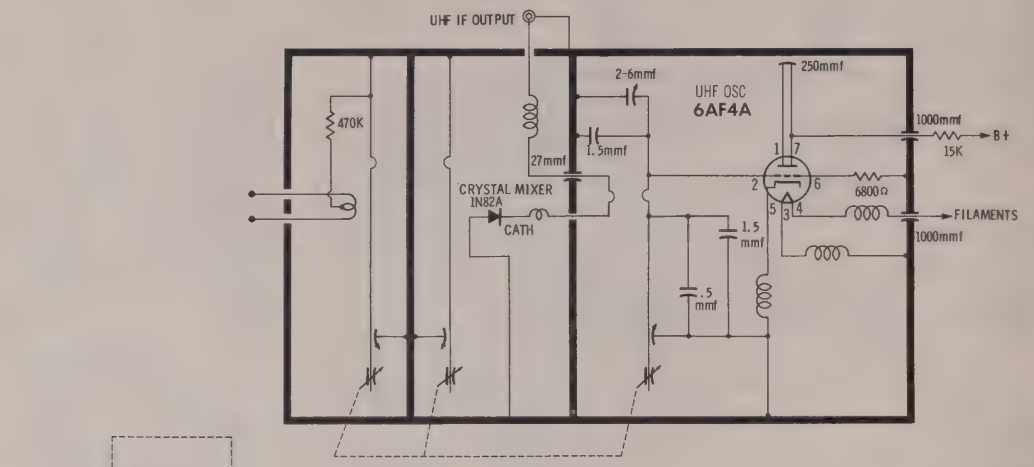
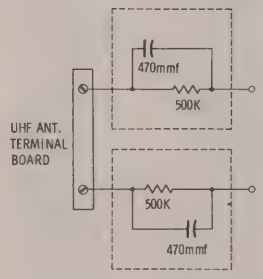
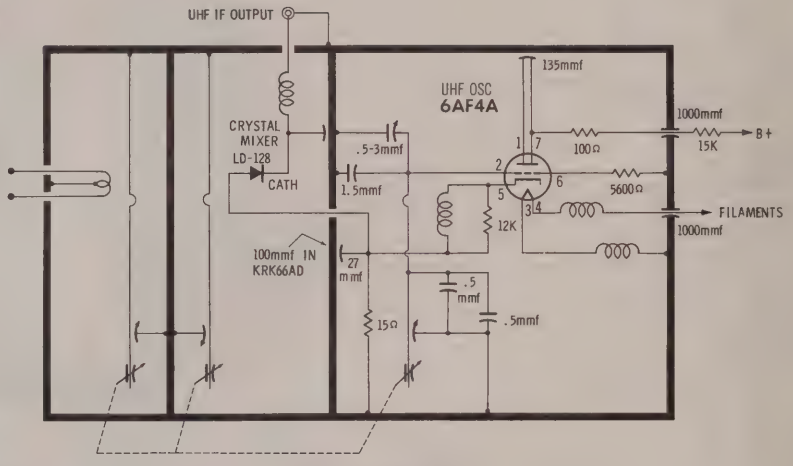
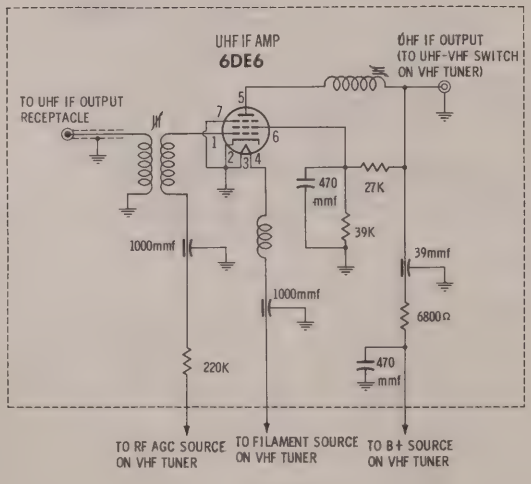


KRK66AC (962048)





KRK66AC, AD, P (962047)



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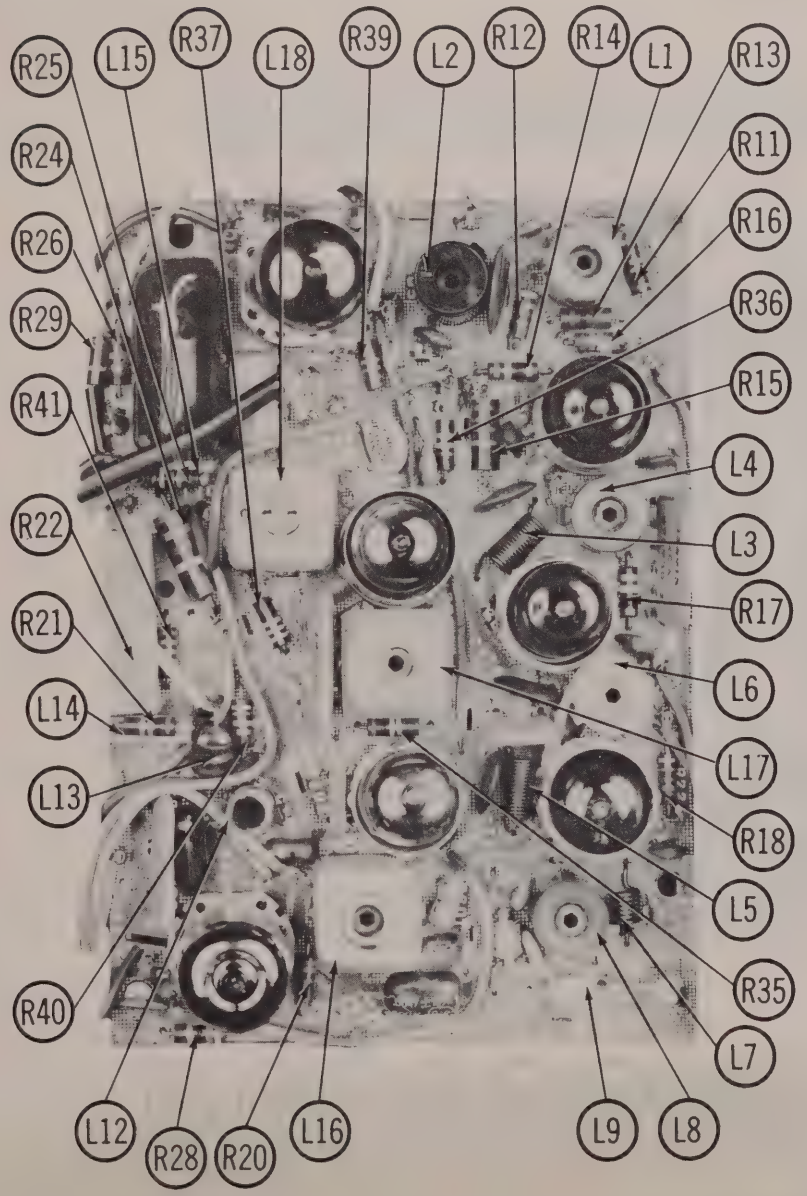
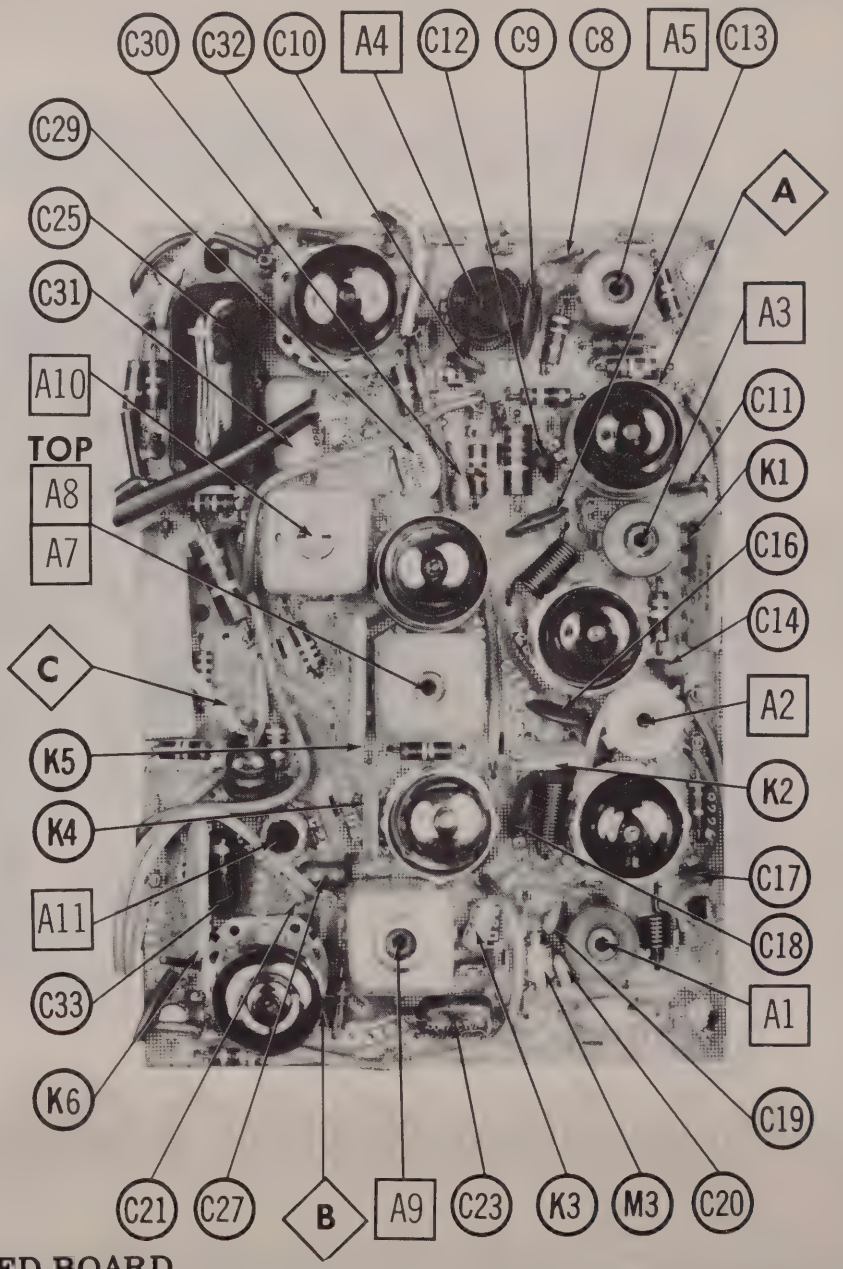
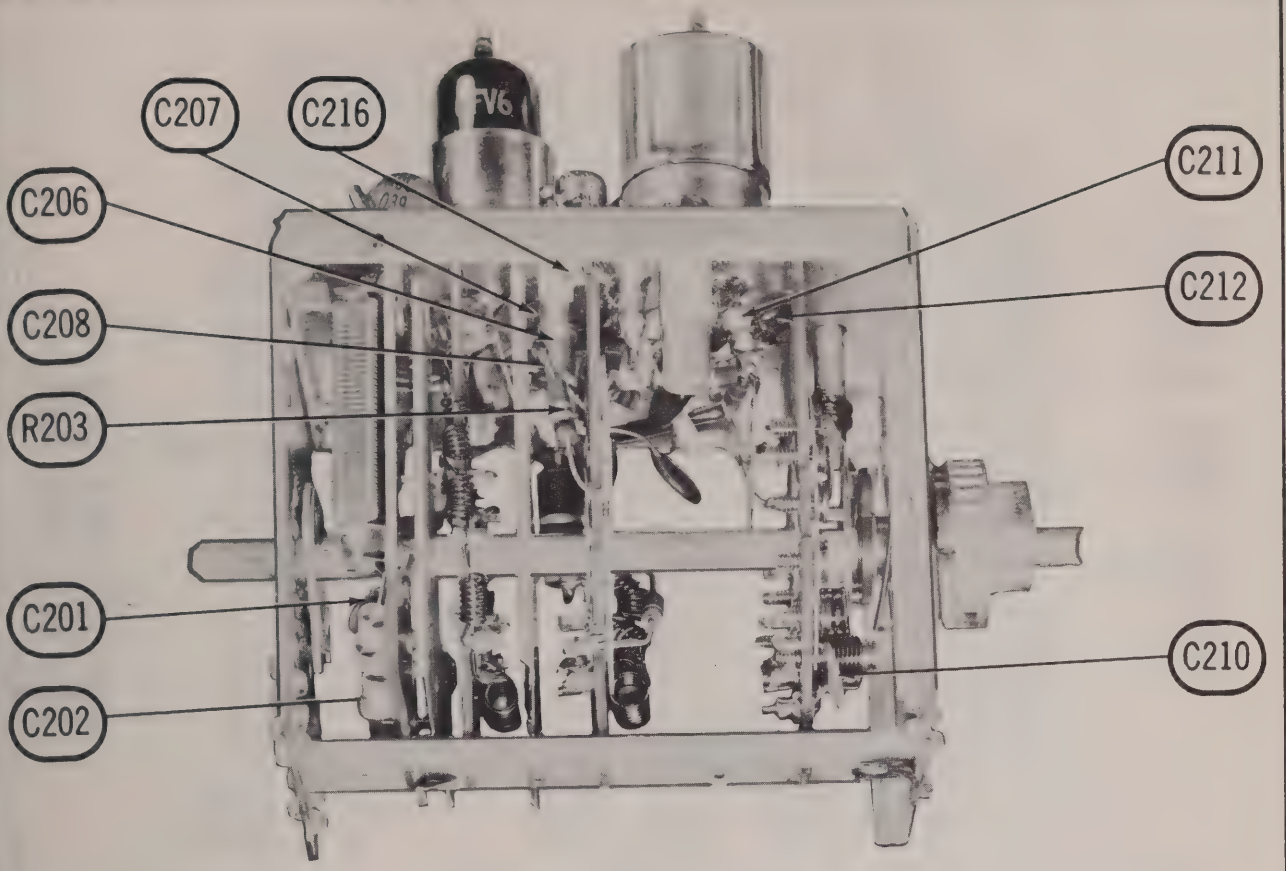
UHF TUNER

SWEEP PRINTED BOARD

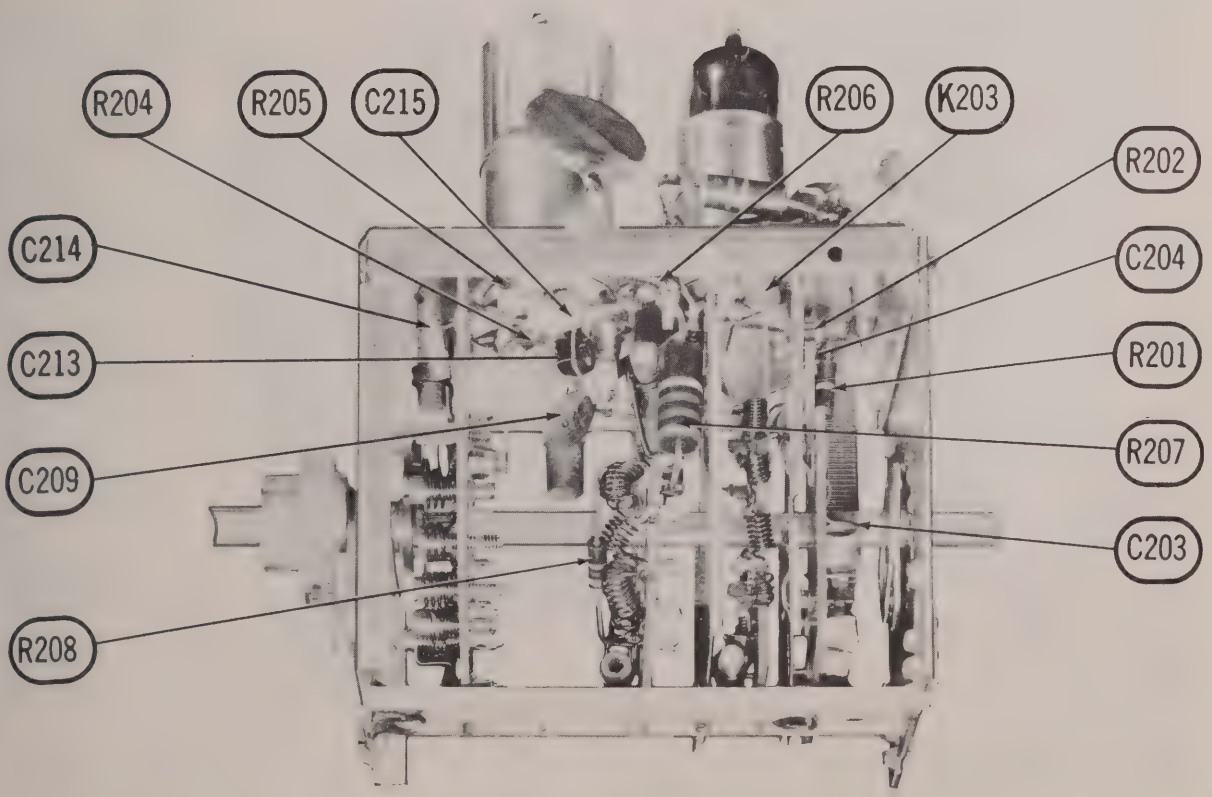




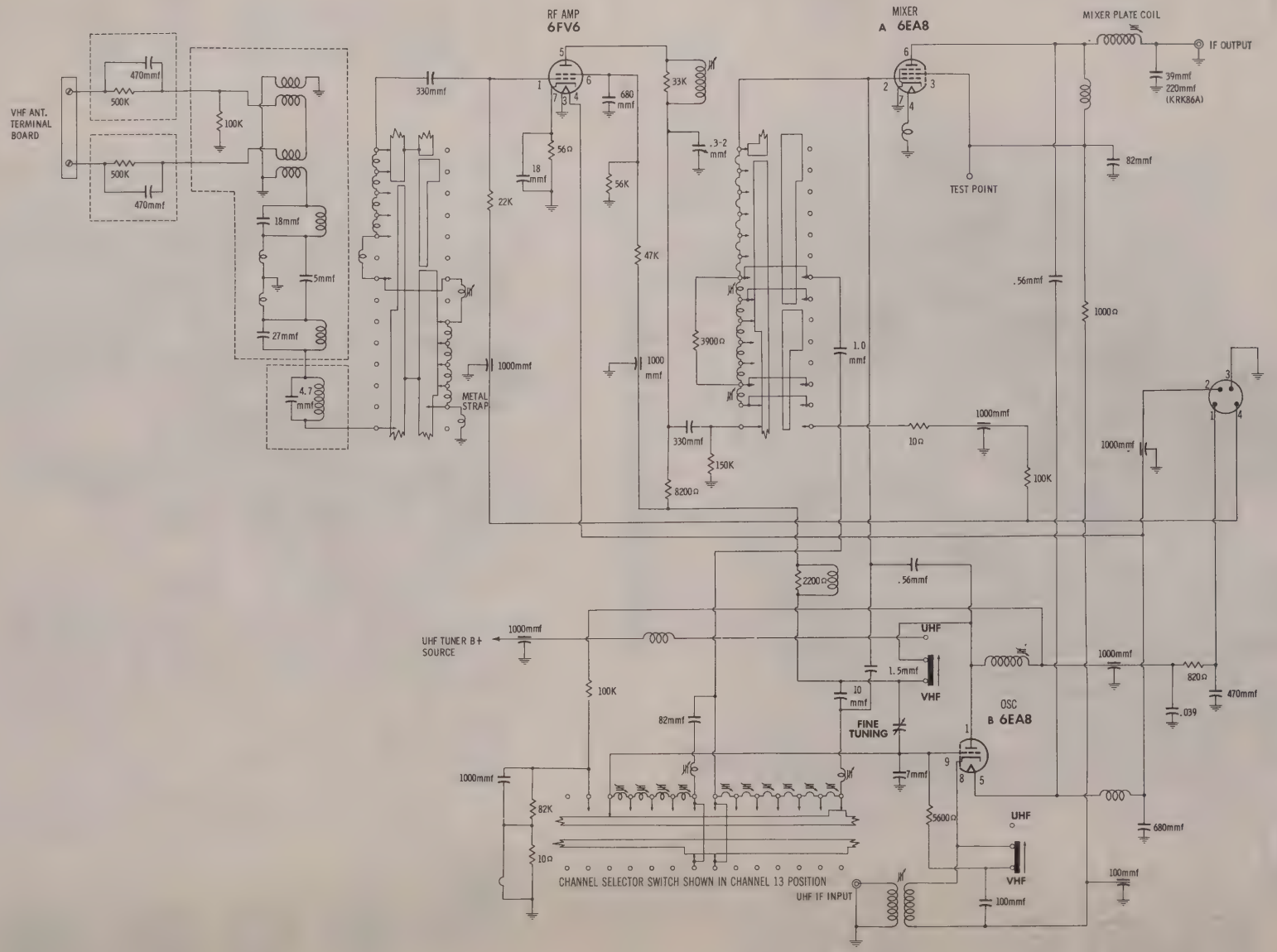
MAIN PRINTED BOARD



TUNER KRK85 LEFT SIDE



TUNER KRK85 RIGHT SIDE



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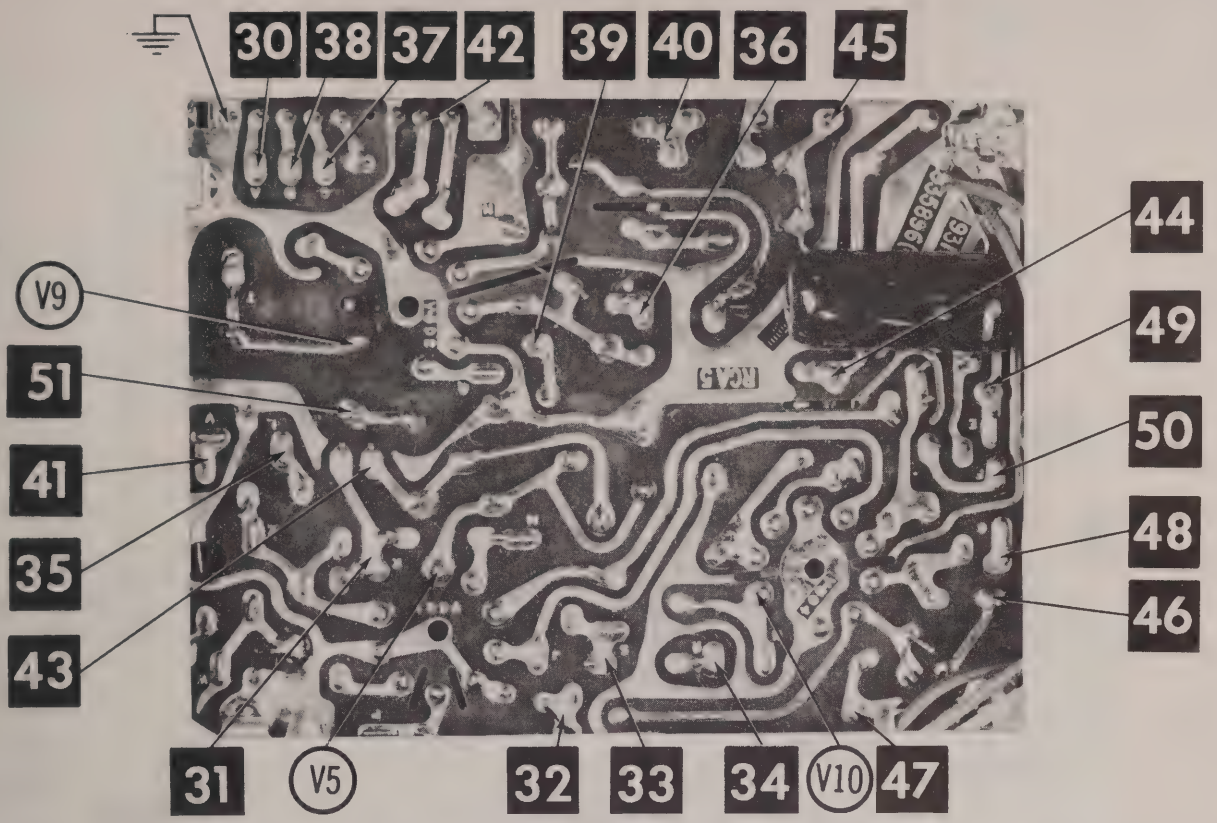
VHF TUNER with UHF provisions KRK86D, E, F

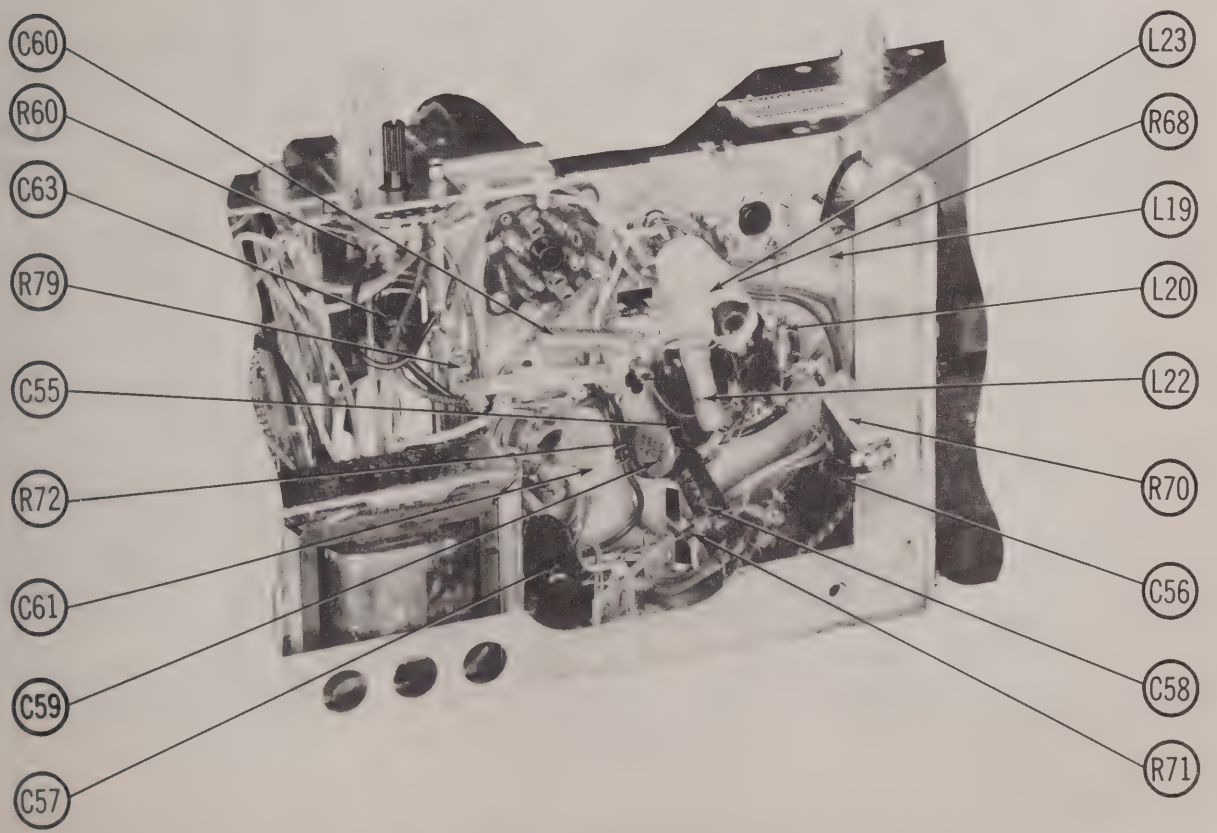
CircuiTrace Numbers 30 thru 51



A Howard W. Sams CIRCUITRACE® Photo

SWEEP
PRINTED BOARD

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



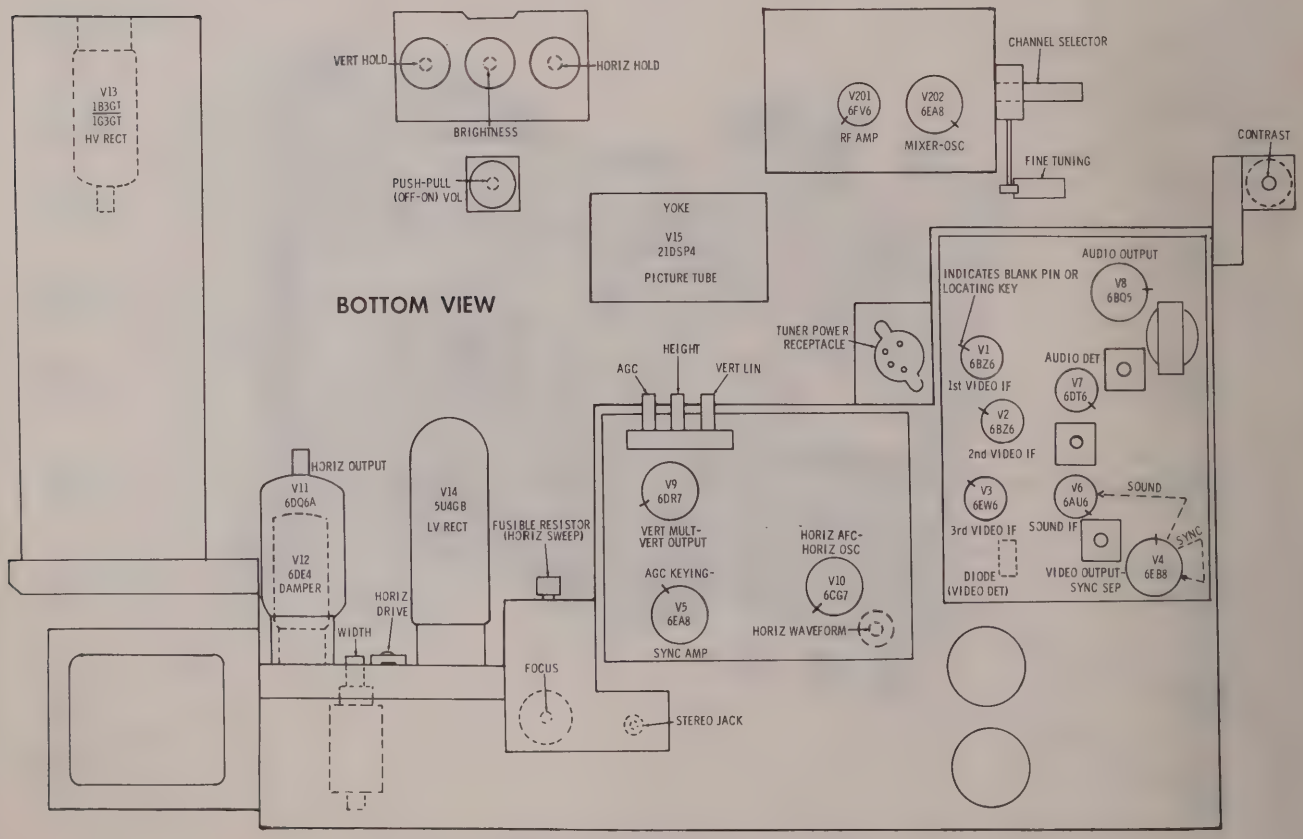
SWEEP CHASSIS BOTTOM VIEW

RESISTANCE MEASUREMENTS

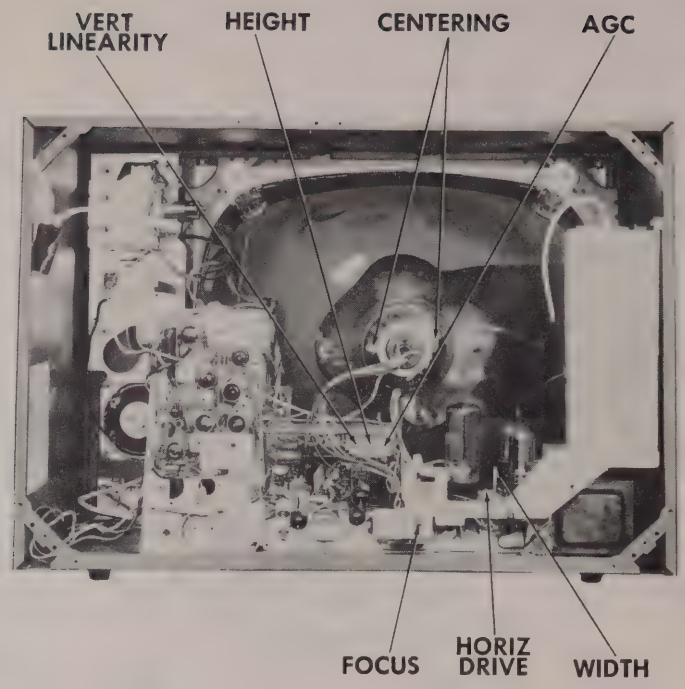
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BZ6	120K	1200Ω	0Ω	.1Ω	▲ 220Ω	▲ 220Ω	0Ω		
V2	6BZ6	100K	▲ 39Ω	0Ω	.1Ω	† 220Ω	† 220Ω	100K		
V3	6EW6	.1Ω	125Ω	.1Ω	0Ω	† 3200Ω	† 3200Ω	0Ω		
V4	6EB8	0Ω	4.9meg	† 2.2meg	.1Ω	0Ω	47Ω	4200Ω	† 18K	† 7500Ω
V5	6EA8	† 17K	† 40K	† 0Ω	.1Ω	0Ω	500K	† 3500Ω	0Ω	† 560K
V6	6AU6	47K	0Ω	.1Ω	0Ω	† 6700Ω	† 6700Ω	82Ω		
V7	6DT6	4Ω	560Ω	0Ω	.1Ω	† 560K	† 9200Ω	470K		
V8	6BQ5	0Ω	0Ω	220Ω	0Ω	.1Ω	NC	† 2500Ω	NC	† 2200Ω
V9	6DR7	† 270Ω	● 1.4meg	● 1.4meg	0Ω	.1Ω	● ‡ 3.5meg	● 2meg	0Ω	330Ω
V10	6CG7	† 0Ω	700K	550K	0Ω	.1Ω	† 82K	● 70K	70Ω	0Ω
V11	6DQ6A	TP	0Ω	NC	† 8200Ω	1meg	NC	.1Ω	100Ω	TOP CAP ‡ 15Ω
V12	6DE4	NC	NC	¶ 3.5meg	NC	† 14Ω	NC	.1Ω	0Ω	
V13	1B3GT/ 1G3GT	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP ‡ 495Ω
V14	5U4GB	NC	¶	NC	26Ω	NC	28Ω	NC	¶	
V15	21DSP4	0Ω	330Ω	Pin 6 ● ‡ 4meg	Pin 10 † 150K	Pin 11 ● 140K	Pin 12 .1Ω			
V201	6FV6	2.3meg	0Ω	0Ω	.1Ω	† 9000Ω	† 30K	56Ω		
V202	6EA8	† 3000Ω	150K	▲ 27Ω	0Ω	.1Ω	▲ 30Ω	0Ω	INF	▲ 5600Ω
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
■ THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
▲ MEASURED FROM PIN 7 OF V2.
† MEASURED FROM 265V SOURCE.
‡ MEASURED FROM PIN 3 OF V12.
▲ MEASURED FROM PIN 8 OF V202.

TP TIE POINT.
NC NO CONNECTION.



TUBE PLACEMENT CHART

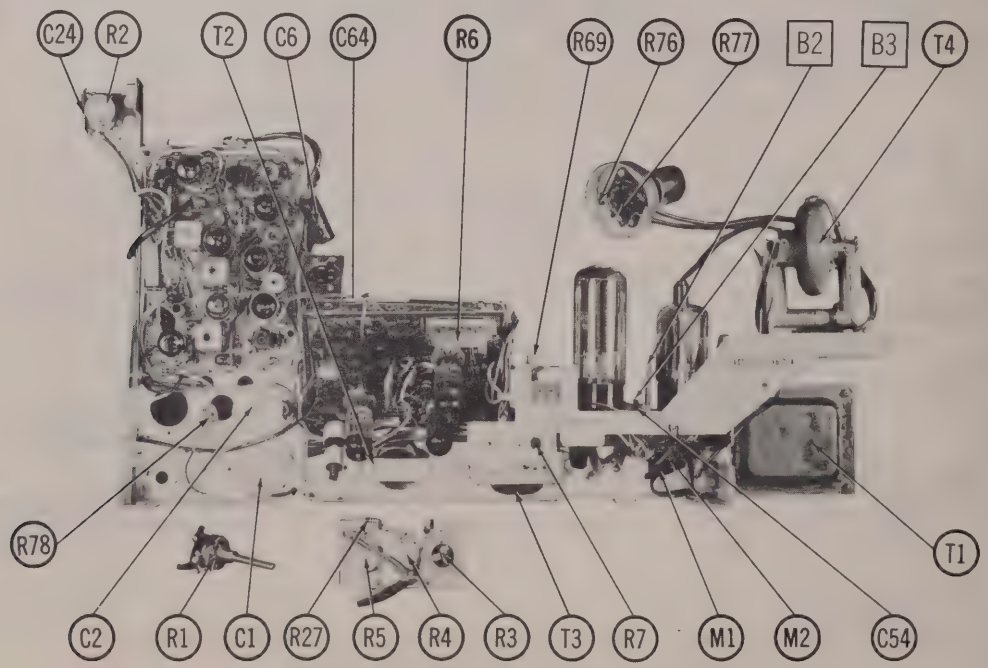


CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Before adjusting the Stabilizing slug (B1), the Horizontal Drive and the Width must be properly adjusted.

Set the Horizontal Hold control to the pull in point. Turn the Width slug (B2) fully counterclockwise and turn Horizontal Drive Trimmer (B3) counterclockwise until a bright vertical line appears near the center of the raster, then turn clockwise until the line just disappears. If no line appears, leave B3 fully counterclockwise. With the Brightness control set to normal level, adjust the Width slug (B2) for an overscan of approximately 3/4 inch on each side of the screen at normal line voltage. Connect a short jumper across the terminals of the Horizontal Stabilizer coil and short the grid (Pin 2) of the Horizontal Oscillator to chassis with a small screwdriver. Adjust the Horizontal Hold control for an upright picture (may appear to float back and forth across the screen). Remove the jumper from across Stabilizer coil, and adjust B1 to again obtain a picture in an upright position. When B1 is properly adjusted, alternately shorting and removing short should not cause the picture to lose sync but instead cause a slight sideways shift of the picture. Remove the short from the grid of the Horizontal Oscillator.



CHASSIS—REAR VIEW

PHOTOFACT* Folder with CIRCUITRACE*

SILVERTONE CHASSIS 456.52200, 201, 202, 203, 528.52200, 201, 202, 203

IMPORTANT FILING NOTICE

The TV Folder for this envelope will be found among the first folders in this complete Set of folders.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

SILVERTONE CHASSIS 456.52200, 201, 202, 203, 528.52200, 201, 202, 203

MODEL 160 (Ch. 528.52200)

SILVERTONE CHASSIS 456.52200, 201, 202, 203, 528.52200, 201, 202, 203

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

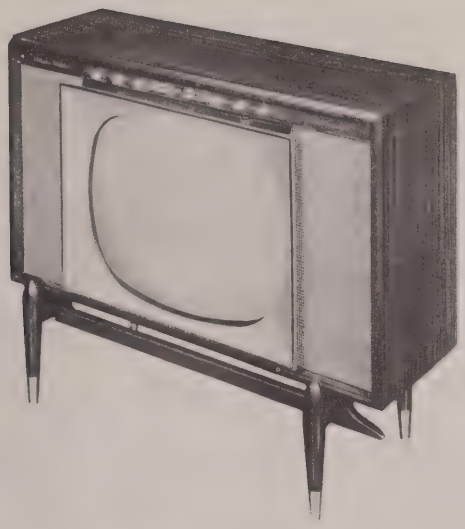
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1959 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

PHOTOFACT* Folder with CIRCUITRACE*

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

SILVERTONE CHASSIS 456.52200, 201, 202, 203, 528.52200, 201, 202, 203

SILVERTONE CHASSIS 456.52200, 201, 202, 203, 528.52200, 201, 202, 203



MODEL 160 (Ch. 528.52200)

CAUTION

ONE SIDE OF AC LINE CONNECTED TO CHASSIS.

Care should be exercised when connecting test equipment or physically contacting chassis. Isolation devices employed by manufacturer should be checked and properly connected before returning receiver to owner.

SILVERTONE CHASSIS 456.52200, 201, 202, 203, 528.52200, 201, 202, 203

TRADE NAME	Silvertone	MODELS	CHASSIS
		PC-160, PC-162, PC-164, PC-180, PC-182, PC-184, PC-186	456.52200 456.52202
		PC-160-5, PC-162-5, PC-164-5, PC-180-5, PC-182-5, PC-184-5, PC-186-5	456.52201 456.52203
		160, 162, 164, 180, 182, 184, 186	528.52200 528.52202
		160-5, 162-5, 164-5, 180-5, 182-5, 184-5, 186-5	528.52201 528.52203

SUPPLIER — Sears, Roebuck & Co., 925 S. Homan Avenue, Chicago, Illinois
TYPE SET — Television Receiver with Power Tuning
TUBES — VHF-Seventeen, UHF-Eighteen
POWER SUPPLY — 110-120 Volts AC, 60 Cycle — RATING 175 Watts, 1.8 Amp. @ 117 Volts AC While Tuning 190 Watts, 2.15 Amp. @ 117 Volts AC
TUNING RANGE — Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL MODEL 160

1. Remove 3 wood screws at top, 1 near AC interlock and loosen 9 other wood screws holding rear cover. Remove tuner antenna leads. Remove rear cover by lifting and pulling straight out.
2. Remove 7 push-on type knobs from the front.
3. Remove 2 wood screws holding AC interlock assembly.
4. Remove speaker leads, yoke plug, picture tube socket, and HV lead.
5. Remove 2 wood screws holding tuner mounting bracket to the cabinet.
6. Remove 2 nuts holding front control bracket and 2 nuts holding the chassis at the bottom.
7. Remove the chassis.

PICTURE TUBE REMOVAL

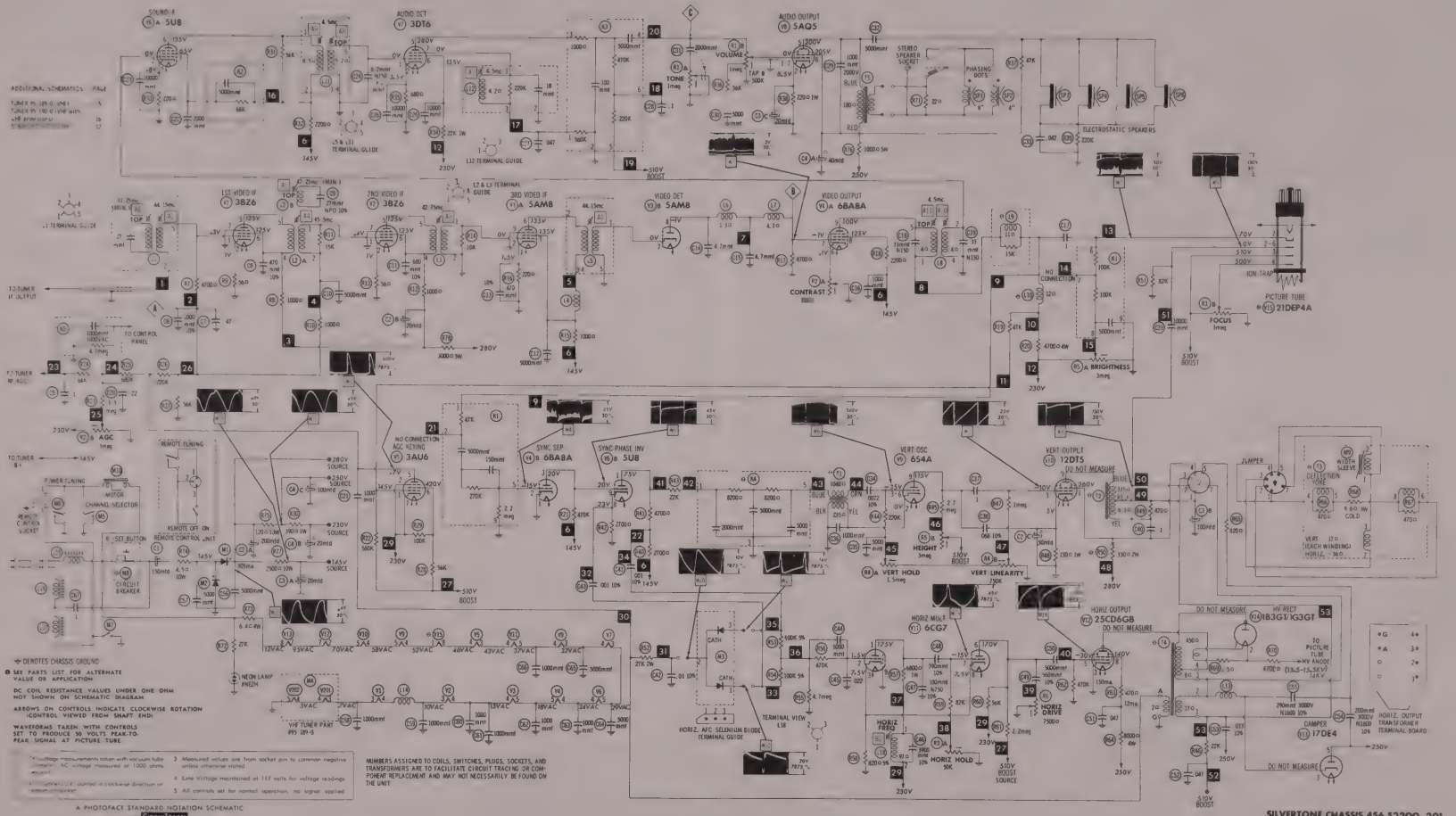
1. Remove 2 screws holding front mask at bottom edge. Pull mask out at bottom and down to remove. Repeat steps 1 and 4 of "Chassis Removal".
2. Remove 4 picture tube mounting bracket bolts at front of cabinet.
3. Remove picture tube from front.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1959 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

JA564

SET 461 FOLDER 2


SILVERTONE CHASSIS 456.52200, 201, 202, 203, 528.52200, 201, 202, 203
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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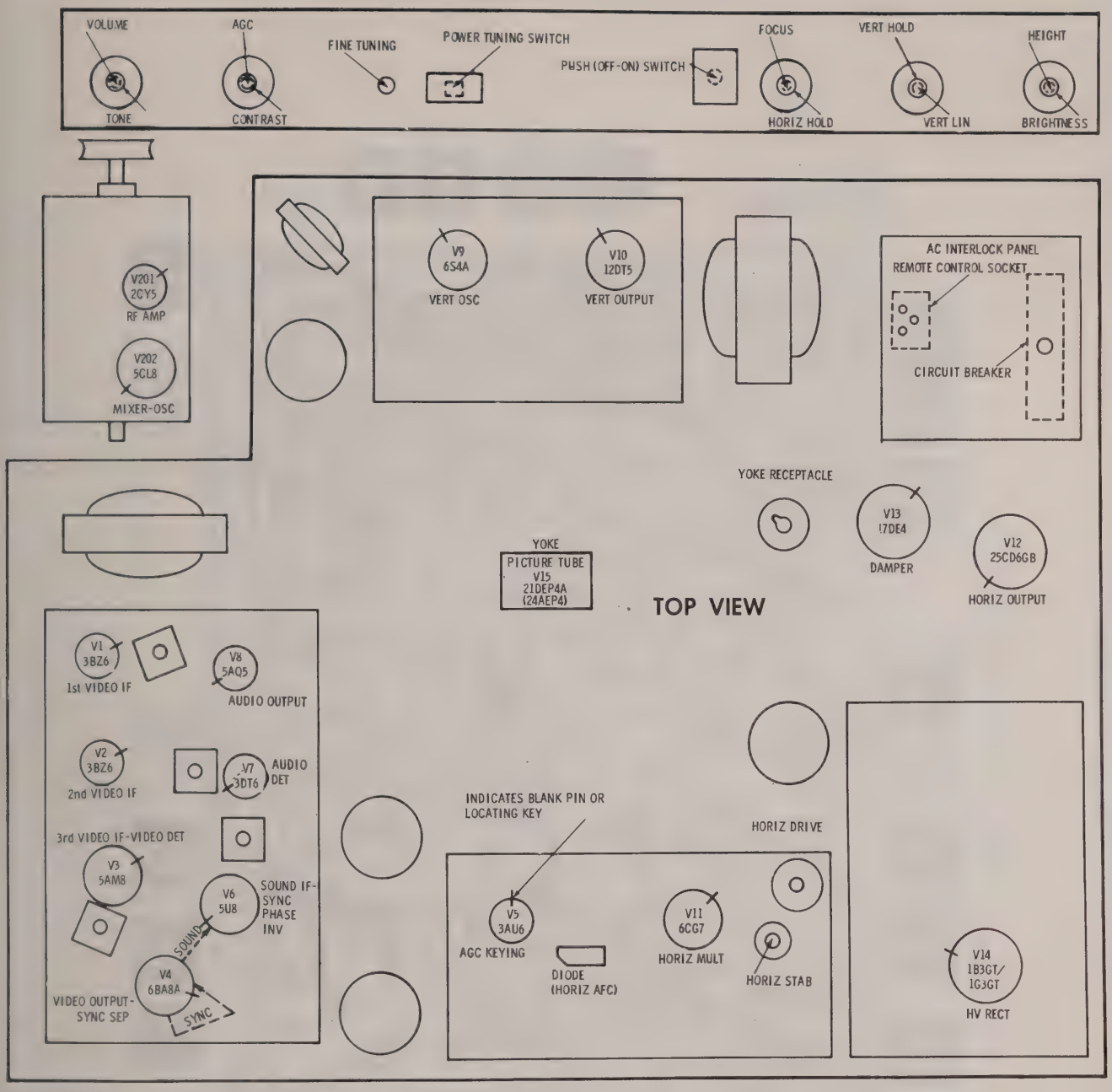
TUBE PLACEMENT CHART



SILVERTONE CHASSIS 456.52200, 201, 202, 203, 528.52200, 201, 202, 203

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

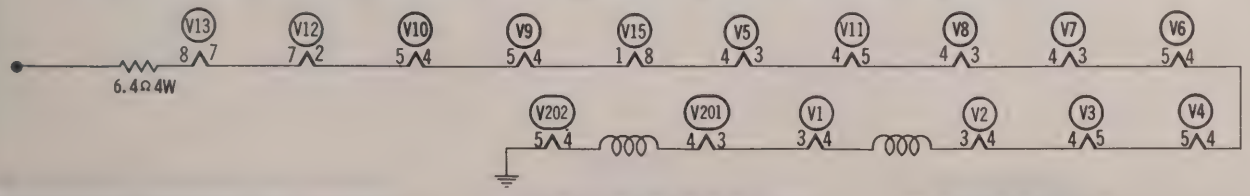
POWER SUPPLY FAILURE
No raster, no sound Circuit Breaker, Rect. (B+)

SWEEP FAILURE
No raster, has sound V11, V12, V13, V14, V15, Rect. (B+)
No vertical deflection V9, V10
Poor vert. linearity or foldover V9, V10
Poor horiz. linearity or foldover V11, V12, V13
Narrow picture V11, V12, V13, Rect. (B+)
Vert. off freq. V9, V10
Horiz. off freq. Diode (Horiz. AFC), V11

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, V3, V4
No pic, no sound, has snow V201, V202, V1
No pic, has sound, has raster V3, V4, V15
Has pic, no sound V6, V7, V8
Overloaded picture V5

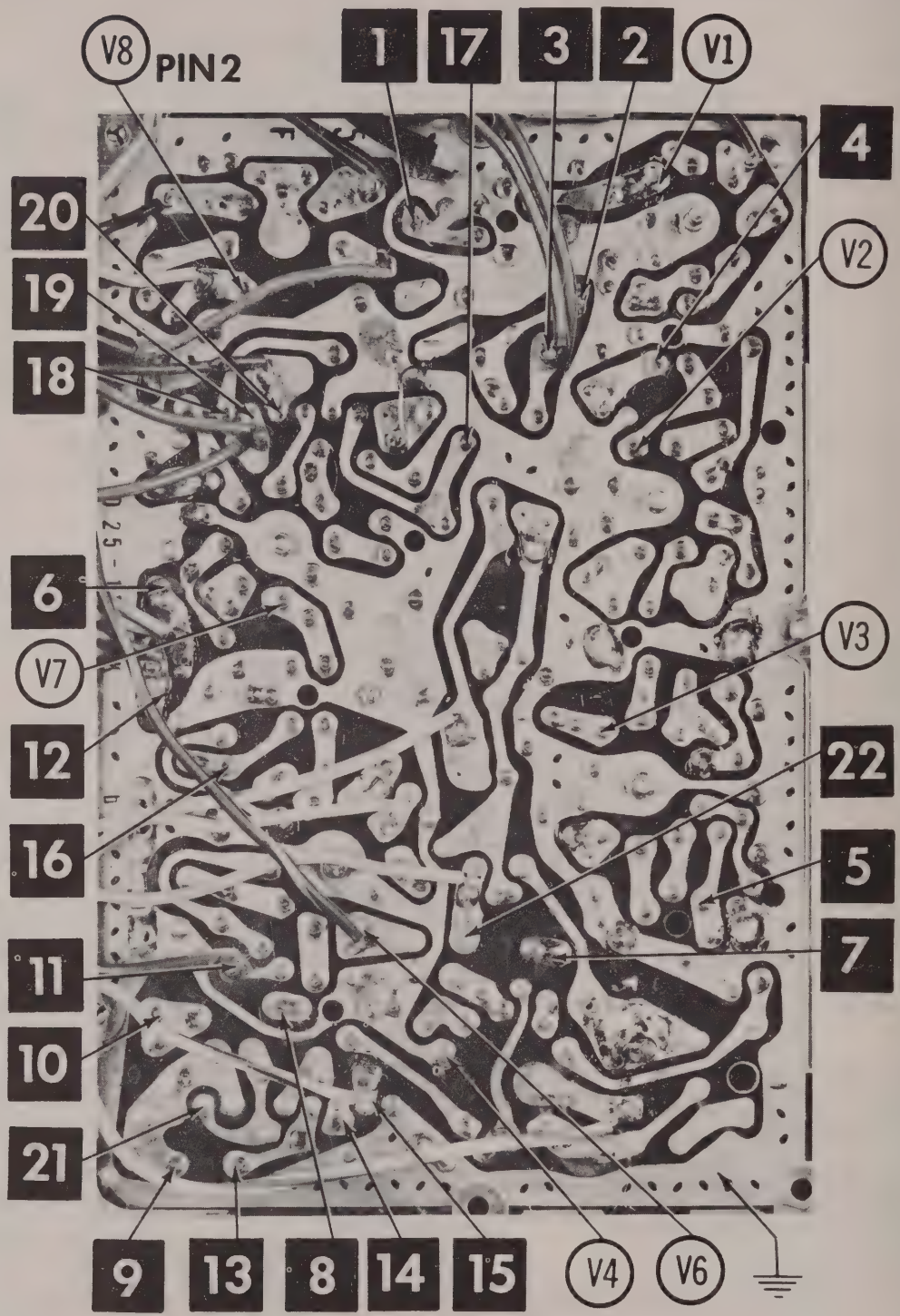
SYNC FAILURE
No vert. sync V8, V9
No horiz. sync Diode (Horiz. AFC), V11
No vert. or horiz. sync V4, V6

This receiver employs tubes used in a series filament network, an open filament in any tube will cause the set to be inoperative. (See circuit below.)



FOLDER 2

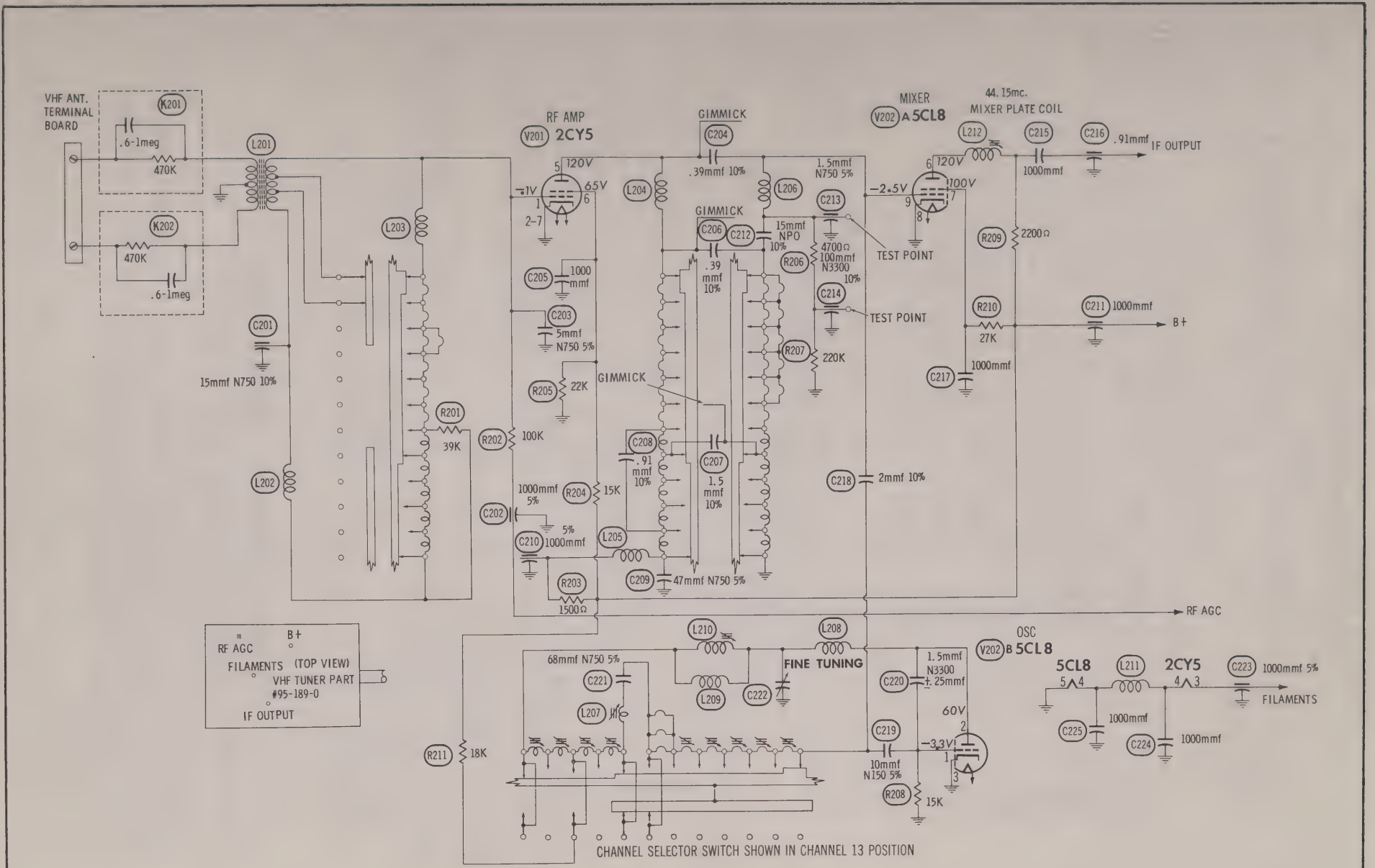
CircuiTrace Numbers 1 thru 22



A Howard W. Sams CIRCUITRACE* Photo

MAIN
PRINTED BOARD

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



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VHF TUNER 95-189-0

SILVERTONE CHASSIS 456.52200, 201, 202, 203, 528.52200, 201, 202, 203

TUNER PARTS LIST AND DESCRIPTIONS

95-189-0

TUBES

• CBS • GENERAL ELECTRIC • RAYTHEON • SYLVANIA •					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V201	RF Amplifier	2CY5	V202	Mixer-Osc.	5CL8

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING			REPLACEMENT DATA						NOTES
	CAP.	VOLT	TOL	SILVERTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C201	15		N750 10%	258-150						
C202	1000		5%	244-1						
C203	5		N750 5%	225-509	N750-DI 5	DTN-5	C10V5U	NT-555	10TCU-V5	
C204	.39		10%	2101-398						
C205	1000			2033-23	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C206	.39		10%	2101-398						
C207	1.5		10%	2101-159	NPO-SI 1.5	TCZ-1R5	C10V15C	ZT-5515	10TCC-V15	
C208	.91		10%	2101-918						
C209	47		N750 5%	233-470		DTN-47	C10Q47U	CN7-447	10TCU-Q47	
C210	1000		5%	244-1						
C211	1000			271-1	EF-001	MFT-1000				
C212	15		NPO 10%	222-150	NPO-DI 15	DTZ-15	C10Q15C	CNO-415	10TCC-Q15	
C213	1.5		N750 5%	259-159						
C214	100		N3300 10%	252-101						
C215	1000			2033-23	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C216	.91			253-910						
C217	1000			2033-23	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C218	2		10%	2101-209	NPO-SI 2	TCZ-2R2	C10V2C	CNO-522	10TCC-V22	
C219	10		N150 5%	164-100					10TCP-Q10	
C220	1.5		N3300 ± 25 mmf	166-159						
C221	68		N750 5%	233-680		DTN-68	C10Q68U	CN7-468	10TCU-Q68	
C222				1713-516						
C223	1000		5%	244-1						
C224	1000			2033-23	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C225	1000			2033-23	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R201	39K	
R202	100K	
R203	1500Ω	
R204	15K	

ITEM No.	RATING	REMARKS
R205	22K	
R206	4700Ω	
R207	220K	
R208	15K	

ITEM No.	RATING	REMARKS
R209	2200Ω	
R210	27K	
R211	18K	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	SILVERTONE PART No.	REPLACEMENT DATA	
K201	Antenna Filter	470K, .6-1meg	330-1	Centralab Sprague	RC-471 AC1-1
K202	Antenna Filter	470K, .6-1meg	330-1	Centralab Sprague	RC-471 AC1-1

COILS (RF-IF)

ITEM No.	USE	SILVERTONE PART No.	NOTES
L201	Ant. Trans.	2309-5	
L202	RF Choke	310-4	
L203	RF Choke	310-4	
L204	RF Choke	363-7	
L205	RF Choke	301-23	
L206	RF Choke	362-6	

ITEM No.	USE	SILVERTONE PART No.	NOTES
L207	Osc. Coil	2746-5	Channel 6
L208	RF Choke	310-4	
L209	RF Choke	312-9	
L210	Osc. Coil	2746-1	Channel 13
L211	Fil. Choke	350-20	
L212	Mixer Plate	2110-9	

TUNER ALIGNMENT INSTRUCTIONS

Suggested Alignment Tools: GENERAL CEMENT #5000, 5003, 5014, 5015, 5016, 8276, 8290
WALSCO #2512, 2515, 2522, 2523, 2525, 2537

OSCILLATOR ALIGNMENT

Turn the set on and allow 15 minute warm-up period. Set the Fine Tuning to the center of its range. To center Fine Tuning align the dot on the drive wheel with the dot on tuner case.
Turn the Channel Selector to the highest frequency channel operating in the area. Adjust the proper oscillator adjustment screw for clearest picture. The oscillator adjustment screws are identified by the channel number stamped into the metal next to the proper adjustment opening. Channels 7 and 8 share the same screw for adjustment, all others have separate adjustment screws.
Be very careful not to turn any of the adjustment screws too far counterclockwise, or they will fall out.
Always adjust the highest operating channel first, then the others in descending order.

RF AND MIXER ALIGNMENT

This portion of the tuner has been properly aligned at the factory and is very stable. Alignment of this portion should not be attempted in the field.

PRE-ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS

Suggested Alignment Tools: GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545
Use an ISOLATION TRANSFORMER TO PROTECT the Test Equipment.
The high voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.

VIDEO IF ALIGNMENT

Short the antenna leads together but not to chassis.
Connect the negative lead of a 3 volt bias supply to point (A). Positive to chassis.
Detune Mixer Plate Coil by turning core fully counterclockwise.
Detune A2, A4, A5 and A6 by presetting for maximum core separation.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	Place a thin insulated metal strip between the Mixer-Osc. tube (V202), and tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	44.15MC (Unmod)	Any non-interfering channel	DC probe thru 10K to point (B). Common to chassis. (Across Video Det. load)	A1, A2, & Mixer Plate Coil	Adjust for maximum deflection.
2.	"	"	42.75MC	"	"	A3	"
3.	"	"	45.5MC	"	"	A4	"
4.	"	"	47.25MC	"	"	A5	Adjust for MINIMUM deflection. Repeat steps 3 and 4.
5.	"	"	41.25MC	"	"	A6	Adjust for MINIMUM deflection.

OVERALL VIDEO IF RESPONSE CHECK

Short antenna terminals together but not to chassis.
Attenuate sweep generator output to maintain not more than 2 volts peak to peak on the scope (-3 volts DC at point (B)).
If separate marker generator is used, couple loosely to the sweep cable.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Direct	Place a thin insulated metal strip between the Mixer-Osc. tube (V202), and tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	44.15MC (10MC Swp)	41.25MC 42.5MC 43.5MC 44.15MC 45.0MC 45.75MC 47.25MC	Any non-interfering channel	Vert. Amp. thru 10K to point (B). Low side to chassis.		Check for response similar to Fig. 1. Retouch Mixer Plate Coil if necessary to place 45.75MC marker at 50%. A2 may be retouched for correct tilt.

SOUND IF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	.001mfd	High side to point (B). Low side to chassis. Use high output.	4.5MC (400∿ FM 15KC Swp)	Any non-interfering channel	AC probe to point (C). Common to chassis.	A7, A8	Adjust A7 for maximum deflection. (If two peaks occur, use highest peak). Adjust A8 for maximum deflection. Retouch A7.
8.	"	"	"	"	"	A9, A10, A11	Reduce output to 500 microvolts. Adjust A9, A10 and A11 for maximum deflection, Keep reducing generator signal to keep VTVM reading from exceeding 4.5 volts.

4.5MC TRAP ALIGNMENT

Tune in a strong TV signal and check the picture tube for evidence of 4.5MC beat interference. If necessary, retouch A11 until the horizontal scanning lines are smooth and continuous.

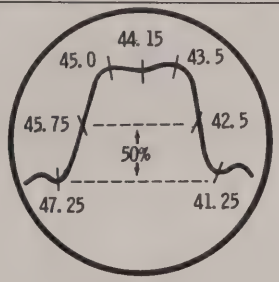
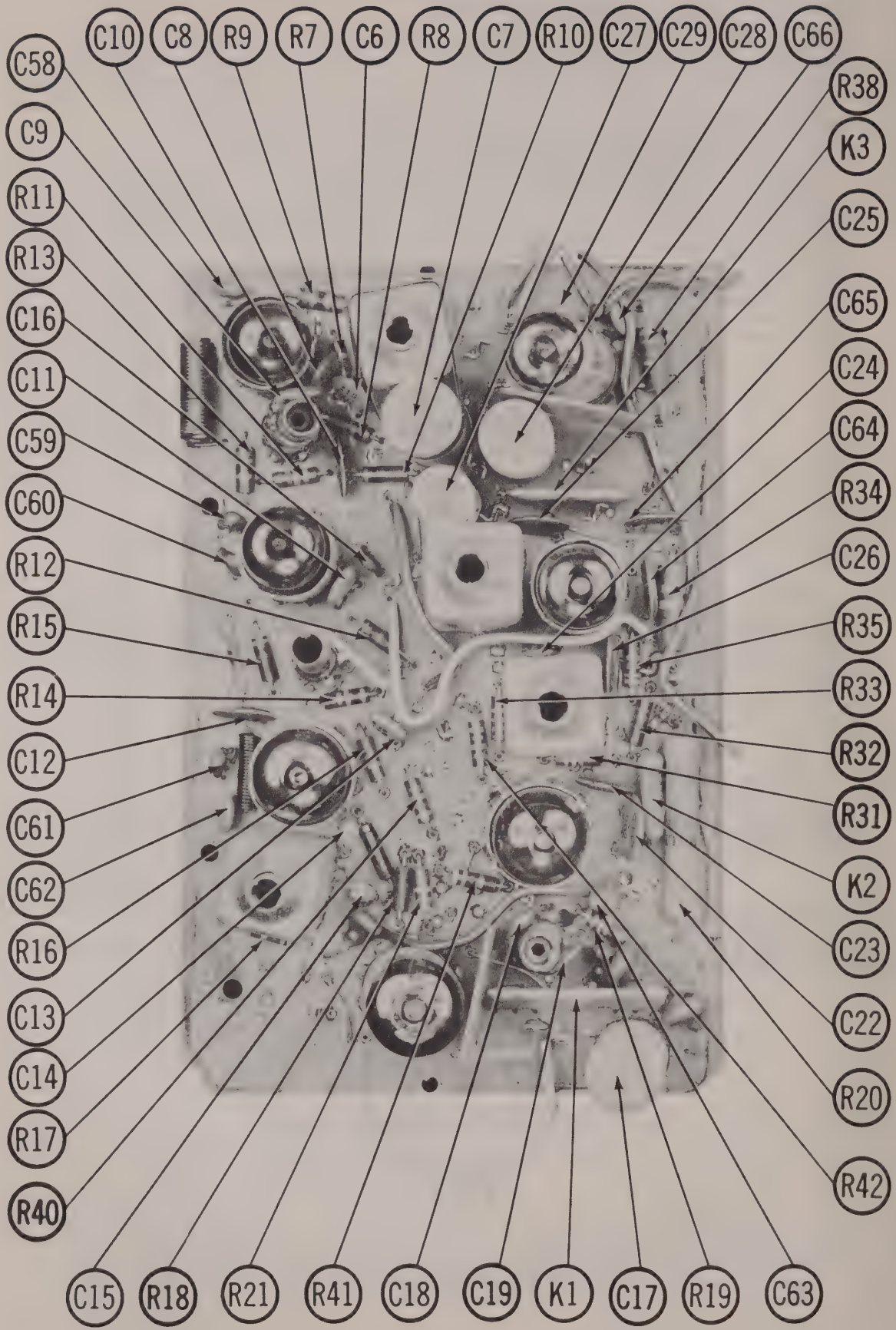
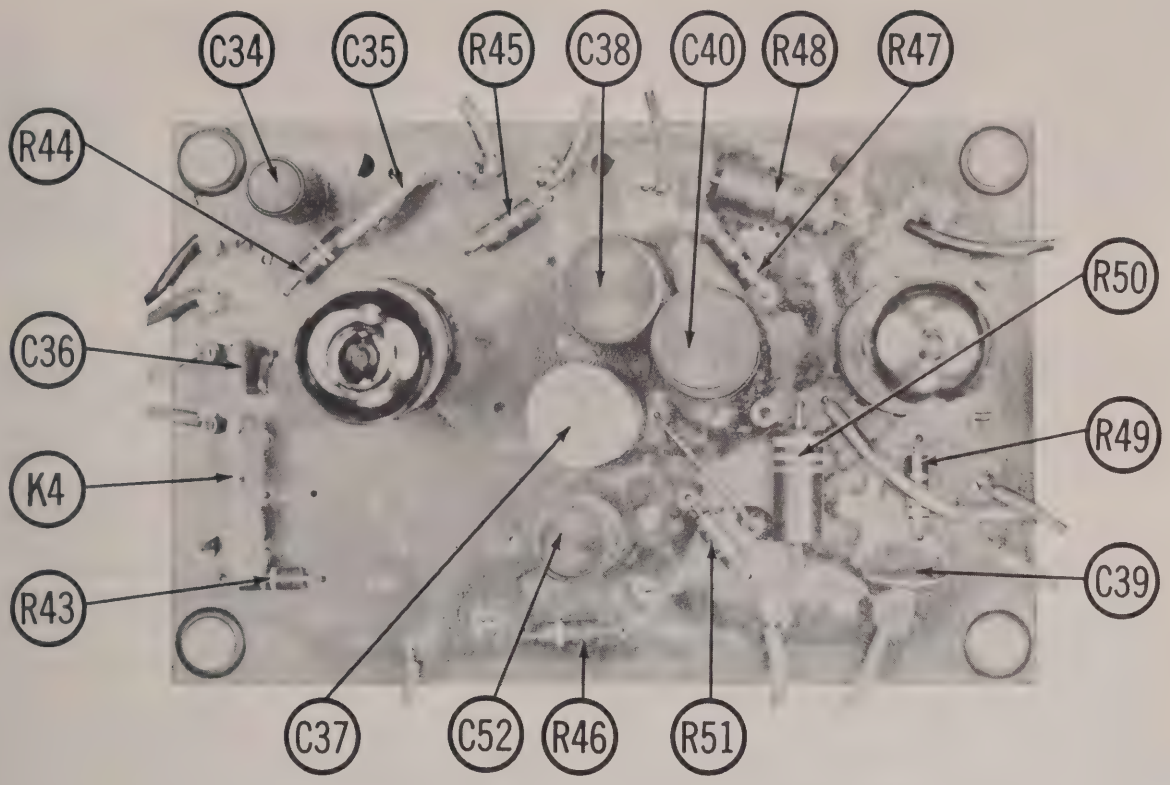


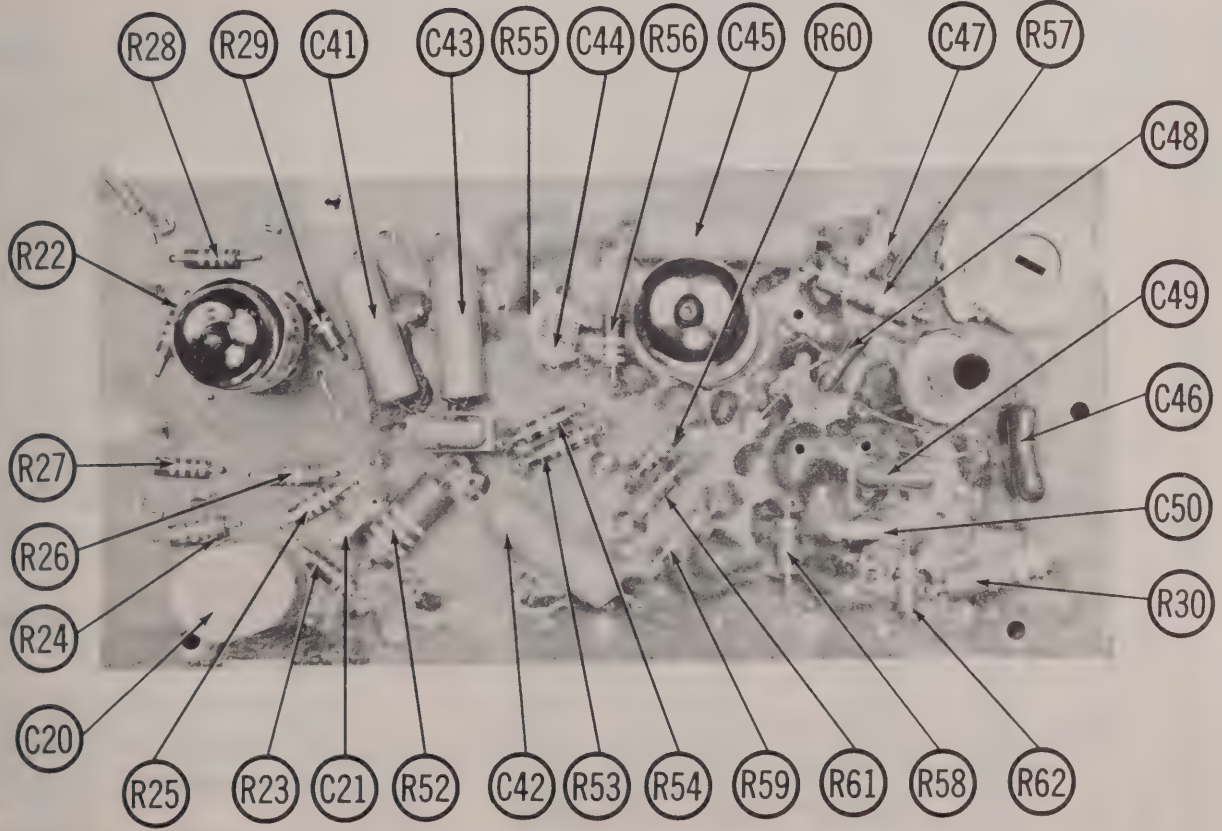
FIG. 1



MAIN PRINTED BOARD



VERTICAL PRINTED BOARD



HORIZONTAL PRINTED BOARD

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No	CBS • GENERAL ELECTRIC • RAYTHEON • SYLVANIA • USE	TYPE	ITEM No	USE	TYPE
V1	1st Video IF Amp	3BZ6	V8	Audio Output	5AQ5
V2	2nd Video IF Amp	6BZ6	V9	Vert. Osc	6BA4
V3	3rd Video IF Amp - Video Det	5AM8	V10	Vert. Output	12DT5
V4	Video Output-Sync Sep	6BA8A	V11	Horiz. Mult	6CG7
V5	AGC Keying	3AU6	V12	Horiz. Output	25CD6GB
V6	Sound IF Amp - Sync Phase Inv.	5U8	V13	Damper	17DE4
V7	Audio Det	3DT6	V14	HV Rect	1B3GT/ 1G3GT

PICTURE TUBE

ITEM No	REPLACEMENT DATA: Silvertone PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
V15	21DEP4A		21DEP4A ① 21DEP4 ① 21CEP4 ①		21DEP4A ③	① Aluminized ③ Silver Screen "86"
	24AEP4	24AEP4 ①	24AEP4 ①		24AEP4 ③	

ELECTROLYTIC CAPACITORS

ITEM No	RATING: CAP.	VOLT	REPLACEMENT DATA: Silvertone PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1	150	200	18-42-3	AFH1-31-75	XA0315	FP131	TMS-34	TVL-1540	
C1A	●200	325	18-46-3	AFH35-111-65	C0735	FP330.13	TMT-165		
B	●30	300			BR6015		TD-30-25	TVL-3636.8	
C	●50	15							
C2A	●30	300	18-47-3	AFH4-56-60	C0894	FP333.15	TMQ-67		
B	●100	300							
C	●20	15							
C4A	●40	300	18-45-3	AFH4-05-60	D0044	FP333.95	TMT-164	TVL-4634	
B	●30	300							
C	●100	300							

* Not normally in distributor's stock Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No	RATING: CAP.	VOLT	TOL	REPLACEMENT DATA: Silvertone PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C5	.1	200			P288N-1	DF-104	CUB 2P1	GEM-201	2TM-P1	
C6	1000		10%	20-78-0	DI-1000	DD-103	1R1DL	GP310	10TS-D10	
C7	.47	100		20-117-1	P281N-47		BCDP47J	GEM-2047	2SE-P47	
C8	470		10%	20-56-0	DI-470	DD-471	22R5T47	GP347	10TS-T47	
C9	27		NPO 10%		NPO-DI 25	DD-270	C10G27C	CNO-427	10TCC-G2T	
C10	5000			20-67-0	BPD-005	DD-502	BYA10D5	B-250	5HK-D50	
C11	680		10%	20-116-0	DI-680	DD-681	22R5T68	GP368	10TS-T68	
C12	5000			20-67-0	BPD-005	DD-502	BYA10D5	B-250	5HK-D50	
C13	470		10%	20-56-0	DI-470	DD-471	22R5T47	GP347	10TS-T47	
C14	4.7			20-23-0	NPO-DI 4.7	TCZ-4R7	C10V47C	CNO-547	10TCC-V4T	
C15	4.7			20-23-0	NPO-SI 4.7	TCZ-4R7	C10V47C	CNO-547	10TCC-V4T	
C16	1000			20-65-0	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C17	.1	600		20-42-1	P415N-1	DF-104	BCSP1J	ACE601	46E-P10	
C18	33		N150							
C19	33		N150							
C20	.22	200		20-43-1	P215N-22		BCSP22J	ACE3022	22E-P22	
C21	1000			20-116-0	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C22	3000			20-69-0	BPD-002	DD-302	BYA10D3	B-230	5HK-D30	
C23	10000			20-86-0	BPD-01	DD-103	BYA10S1	B-110	5HK-S10	
C24	6.8		N750 almumf	20-118-0						
C25	10000			20-86-0	BPD-01	DD-103	BYA10S1	B-110	5HK-S10	
C26	10000			20-86-0	BPD-01	DD-103	BYA10S1	B-110	5HK-S10	
C27	.047	400		20-44-1	P415N-047	DD-503	BCS847J	ACE5147	4SE-S47	
C28	.1	600		20-124-1	P615N-1	DF-104	BCSP1J	ACE601	46E-P10	
C29	1000	3000		20-76-0	HVD-30-1000	DD30-102	HVB2D1J	22EV-B10	30CA-D10	
C30	5000			15-50218	BPD-005	DD-502	BYA10D5	B-250	5HK-D50	
C31	3000			15-50216	BPD-003	DD-302	BYA10D3	B-230	5HK-D30	
C32	5000			15-50218	BPD-005	DD-502	BYA10D5	B-250	5HK-D50	
C33	.047	600		20-847-1	P688N-047	DD-503	CUB5847	GEM-5147	6TM-S47	
C34	.0022	600	10%	20-136-1			PM6D22		6TM-D22	
C35	5000			20-177-0	BPD-005	DD-502	BYA10D5	B-250	5HK-D50	
C36	1000			20-134-0	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C37	.1	400		20-42-1	P415N-1	DF-104	BCSP1J	ACE401	46E-P1	
C38	.068	600	10%	20-125-1			PM6S68		6TM-S68	
C39	10000			20-86-0	BPD-01	DD-103	BYA10S1	B-110	5HK-S10	
C40	.1	600		20-124-1	P615N-1	DF-104	BCSP1J	ACE601	46E-P1	
C41	.001	600	10%	16-10247			PM4D1	GEM-1621	6TM-D1	
C42	.01	200	10%	16-10237		V84CS2E-10%	PM4S2	GEM-1611	4TM-S2	
C43	.001	600	10%	16-10247		V84CS1E-10%	PM4S1	GEM-1621	6TM-S1	
C44	5000			20-86-0	BPD-005	DD-502	BYA10D5	B-250	5HK-D50	
C45	.022	200		15-23238		P288N-022	CUB4222	GEM-4122	2TM-S22	
C46	1900		10%	20-16-2		1464-0059X	UR5D89	MC1463.5	MS-189	
C47	100		N750-DI 10%	20-132-0	DTN-100	C10T1U	CN7-310	10TCU-T10		
C48	330		10%	20-15-3		1468-00039K	22R5T39	MCB343	MS-339	
C49	560		10%	20-14-2		1468-00056K	22R5T56	MCJ347	MS-356	
C50	5000			20-67-0	BPD-005	DD-502	BYA10D5	B-250	5HK-D50	
C51	.047	400		15-47248	P488N-047	DD-503	CUB6347	GEM-4147	4TM-S47	
C52	.047	600		20-125-1	P615N-047	DD-503	BCS847J	ACE6147	6SE-S47	
C53	.033	600	10%	16-33357		V84CS33-10%	PM6S33	GEM-1613	6TM-S33	
C54	200	3000	N1500 10%	20-137-0						
C55	220	3000	N2200 10%	20-138-0						
C56	5000			15-50217	BPD-006	DD-502	BYA10D5	B-250	5HK-D50	

CAPACITORS (cont)

ITEM No	RATING: CAP.	VOLT	TOL	REPLACEMENT DATA: Silvertone PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C57	5000			15-50217	BPD-006	DD-502	BYA10D5	B-250	5HK-D50	
C58	1000			20-65-0	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C59	1000			20-65-0	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C60	1000			20-65-0	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C61	1000			20-65-0	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C62	1000			20-65-0	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C63	1000			20-65-0	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C64	5000			20-67-0	BPD-005	DD-502	BYA10D5	B-250	5HK-D50	
C65	5000			20-67-0	BPD-005	DD-502	BYA10D5	B-250	5HK-D50	
C66	1000			20-65-0	BPD-001	DD-102	BYA10D1	B-210	5HK-D10	
C67	1	400		18-10448	P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	

CONTROLS

ITEM No	RATING: RESISTANCE	WATTS	REPLACEMENT DATA: Silvertone PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No	MALLORY PART No	INSTALLATION NOTES
R1A	1meg	½	34-363-0	F1-52		† (GJ-1126	* (UE-4061	Tone
B	1meg	½		R3-60				Volume, Tap ④ 500K
R2A	300Ω	½	34-147-1	F1-0		†† (GJ-1124	▲ (UE-4058	Contrast
B	3meg	½		R3-78 *				AGC
R3A	50K	½	34-146-1	F1-29		† (GJ-1123	▲ (UE-4057	Horiz. Hold
B	3meg	½		R3-78 *				Focus
R4A	1.5meg	½	34-168-1	F1-64		†† (GJ-1125	● (UE-4059	Vert. Hold
B	750K	½		R3-51 *				Vert. Lin.
R5A	3meg	½	34-169-1	F1-78		† (GJ-1127	§ (UE-4060	Brightness
B	2meg	½		R3-78 *				Height
R8A	7500Ω	½	34-144-1			B11-115		Horiz. Drive
B	2meg	½				TM4		

* Cut and split inner shaft before assembling.

† "Concentrikit" Equivalent: K-8 Kit with Base Elements & Shafts: B13-137, P17-118 (Panel) B19-137X, R1-202 (Rear) R-5 Retainer

†† "Concentrikit" Equivalent: K-8 Kit with Base Elements & Shafts: B11-201, P17-118(Panel) B11-140, R15-005 (Rear) R-5 Retainer

‡ "Concentrikit" Equivalent: K-8 Kit with Base Elements & Shafts: B11-123, P17-118 (Panel) (Not available as a factory assembled unit.) B11-140, R15-005 (Rear) R-5 Retainer

‡‡ "Concentrikit" Equivalent: K-8 Kit with Base Elements & Shafts: B11-138, P17-118 (Panel) (Not available as a factory assembled unit.) B11-136, R15-005 (Rear) R-5 Retainer

* "STA-LOC" Equivalent: FA18A, RU187S5, OS562A, UE3062.
▲ "STA-LOC" Equivalent: FA32L, RU36L, OS562A, UE4057.
▲ "STA-LOC" Equivalent: FA54L, RU38L, OS562A, UE4057.
● "STA-LOC" Equivalent: FA155L, RU754L, OS562A, UE4057.
§ "STA-LOC" Equivalent: FA36L, RU36L, OS562A, UE4057.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R7	4700Ω	
R8	1000Ω	
R9	56Ω	
R10	1000Ω	
R11	15K	
R12	1000Ω	
R13	56Ω	
R14	10K	
R15	1000Ω	
R16	220Ω	
R17	4700Ω	
R18	22000Ω	
R19	47K	
R20	4700Ω 4W	
R21	470K	
R22	560K	
R23	3.3meg	
R24	68K	
R25	680K	
R26	220K	
R27	56K	
R28	56K	
R29	100K	
R30	390Ω 1W	

ITEM No.	RATING	REMARKS
R31	56K	
R32	2200Ω	
R33	220Ω	
R34	22K 1W	
R35	680Ω	
R36	56K	
R37	47K	
R38	220Ω 1W	
R39	220K	
R40	2700Ω	
R41	4700Ω	
R42	2700Ω	
R43	22K	
R44	220K	
R45	2.7meg	
R46	22K	
R47	1meg	
R48	150Ω 1W	
R49	470Ω	
R50	330Ω 2W	Note 1
R51	82K	
R52	27K 2W	
R53	100K 5%	
R54	100K 5%	

ITEM No.	RATING	REMARKS
R55	4.7meg	
R56	470K	
R57	68000 1W	
R58	8200 5%	
R59	82K	
R60	56K	
R61	2.2meg	
R62	470K	
R63	4700Ω	
R64	8000Ω 4W	#61-39-1
R65	820Ω	
R66	470Ω	
R67	470Ω	
R68	9.6Ω COLD 4W	#61-30-0
R69	1.5Ω	
R70	4700Ω	
R71	22Ω	
R72	27K	
R73	6.4Ω 4W	#61-156-0
R74	4.5Ω 10W	#61-153-0
R75	120Ω 10W	
R76	1000Ω 5W	
R77	2500Ω 10W	
R78	3000Ω 5W	

Note 1. Not used in Ch. 456/528.52201, 203.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Silvertone PART No.	REPLACEMENT DATA	
K1	Video & Sync Coupling	150mmf, 5000mmf, 5000mmf, 47K, 100K, 100K, 270K, 2.2meg	13-24-3A	Sprague	ST-16
K2	Sound IF Screen	5000mmf, 68K	13-21-3		
K3	Audio Coupling	100mmf, 5000mmf, 1000Ω, 220K, 470K, 560K	13-25-3	Sprague	HN-6
K4	Vert. Integrator	2000mmf, 5000mmf, 5000mmf, 8200Ω, 8200Ω	13-31-3A ①	Aerovox Centralab Sprague Mallory	PA-110-4 PC-105 V-4 MS-104
K5	Control Panel Isolation	1000mmf (1000VAC), 4.7meg	13-17-3		

① Alternate Part #13-30-3.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: Silvertone PART No.	Granger PART No	Meissner PART No	Merit PART No	Miller PART No	Ram PART No	NOTES
L1A	1st Video IF	10-25-3						
B	41.25MC Trap							
L2A	2nd Video IF	10-25-3						
B	47.25MC Trap							
L3	3rd Video IF	10-32-3						
L4	RF Choke	10-151-1						
L5	4th Video IF	10-34-3						
L6	Resonant Choke	10-65-1						12uh
L7	Series Peaking Coil	10-64-1			TV-122	6110		60uh
L8A	Sound Take-off Coil	10-153-1						
B	4.5MC Trap							
L9	Series Peaking Coil	10-86-1	19-3350 *	19-3250 *	TV-126 *	6130 *	VP-6 *	270uh ①
L10	Shunt Peaking Coil	10-86-1	19-3350	19-3250	TV-126	6130	VP-6	270uh ②
L11	2nd Sound IF	10-32-3						
L12	Quadrature Coil	10-17-5						
L13	RF Choke	10-155-1	19-1003	19-1003	BC-563	4606		2.5uh
L14	Fil. Choke	10-122-1	19-1003	19-1003	BC-563	4606		2.5uh
L15	Line Choke	10-149-1	19-3036	19-3036	TV-180	6176	VP-1	40uh
L16	Line Choke	10-149-1	19-3036	19-3036	TV-180	6176	VP-1	40uh
L17	Line Choke	10-149-1	19-3036	19-3036	TV-180	6176	VP-1	40uh

① Wound on 15K resistor. Alternate Part #10-150-1 ② Alternate Part #10-147-1 * Parallel with 15K resistor

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: Silvertone PART No.	Halldorson PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Thordarson PART No.	NOTES
L18	97Ω		10-18-5						Horiz. Stabilizer

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA: Silvertone PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	Vert. Oscillator	C80-3-7B	28A05	A-3006	V406		V80-201	28A05	A-122X
	Alt Vert Osc.	80-3-7	28A05	A-3006	V406		V80-201	28A05	A-122X
T2	Vert. Output	C80-4-2C		A-2815 ① ②			VO-100 ②		A-118X ①
	Alt. Vert. Output	80-4-3		A-2815 ① ②			VO-100 ②		A-118X ①
T3	Yoke-Horiz.(18MH) (110°)-Vert.(31MH)	D80-10-4	Y-83 ④					Y-83 ④	Y-83 & WW-20
	Alt. Yoke	80-10-4	Y-83 ④					Y-83 ④	Y-83 & WW-20
	Rear Cover & Centering Device	21-404-0							YC-130
	Yoke Clamp	22-116-3							
T4	Horiz. Output	D80-10-3B						D-187 *	
	Alt. Horiz. Output	80-10-3							

① Use 8 to 1 turns ratio.
② Cut and tape red and yellow lead.
③ Connect as autoformer.
④ Use original rear cover and centering device.
* Connect same as original.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA: Silvertone PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T5	6000Ω	3-4Ω	80-87-1	24S96	A-2935	AU-606	A-3824	24S96	S-5X	

SPEAKER

ITEM No.	TYPE: SIZE	FIELD	V. C. IMP	REPLACEMENT DATA: Silvertone PART No.	QUAM PART No	NOTES
SP1	6"	PM	3-4Ω	33-400-4		
SP2	6"	PM	3-4Ω	33-400-4		
SP3	Electrostatic			84-6276		
SP4	Electrostatic			84-6276		
SP5	Electrostatic			84-6276		
SP6	Electrostatic			84-6276		

RECTIFIERS

ITEM No.	RATING: CURRENT (Measured)	REPLACEMENT DATA: Silvertone PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	NOTES
M1	.305A	86-1-3 ①	HA-504 ①	SD-500 ①	40K ①	SR500 ①	① Silicon Type
M2	.305A	86-1-3 ①	HA-504 ①	SD-500 ①	40K ①	SR500 ①	② Selenium Type.
M3		86-3-1 ②	KM15 ②	SD-81 ① ②			③ 2 Required

MISCELLANEOUS

ITEM No.	PART NAME	Silvertone PART No.	NOTES
M4	Tuner	95-189-0	VHF Ch. 456/528 52200, 202
	Tuner	95-190-0	VHF with UHF provisions, Ch 456/528.52201, 203
	Tuner	95-193-0	UHF Ch 456/528.52201, 203
M5	Switch	89-388-0	Channel Selector
M6	Switch	89-389-0	Power Tuning

SILVERTONE CHASSIS 456.52200, 201, 202, 203, 528.52200, 201, 202, 203

FOLDER 2

PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS (cont)

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
M7	Switch	69-290-0	Off-On
M8	Circuit Breaker	43-6-2	
	Circuit Breaker	43-7-2	Alternate part number.
M9	Width Sleeve	83-1204	
M10	Motor	59-145	
	Magnet	27-70-2	Beam Alignment used with some picture tubes
	Lamp	89-23	Neon, Includes leads
	Printed Board	84-7369	IF, Sync, Sound, less tubes
	Printed Board	84-7370	Vert., less tubes Ch. 456/528.52200, 201
	Printed Board	84-7370-1	Vert., less tubes Ch. 456/528.52202, 203
	Printed Board	84-7371	Horiz., less tubes

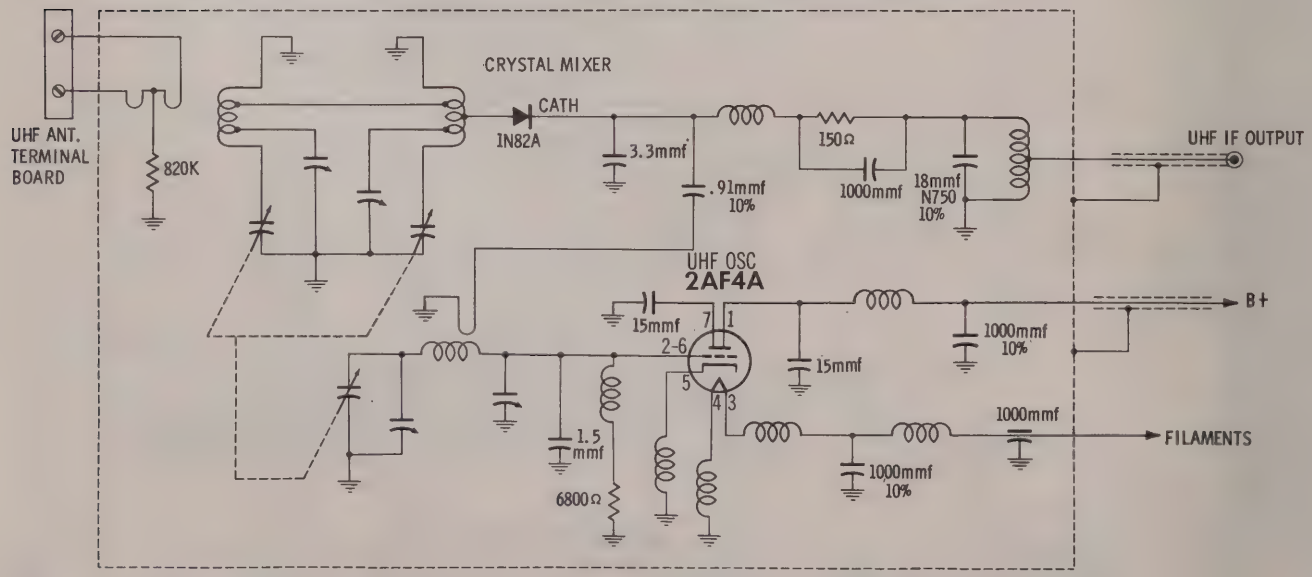
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Safety Glass	48-142-0	Models 180, 180-5, 182, 182-5
Safety Glass	48-156-0	Models 164, 164-5
Safety Glass	40-154-0	Models 160, 160-5, 162, 162-5
Safety Glass	48-155-0	Models 184, 184-5, 186, 186-5
Mask	40-14-4	Models 164, 164-5
Mask	40-13-4	Models 180, 180-5, 182, 182-5
Mask	40-15-4	Models 184, 184-5, 186, 186-5
Bezel	40-30-5	Rear, Models 160, 160-5, 162, 162-5
Bezel	40-29-5	Front, Models 160, 160-5, 162, 162-5
Window	48-166-1	Channel Indicator, Models 184, 184-5, 186, 186-5, 164, 164-5
Knob	52-1195-0	Fine Tuning
Knob	52-926-0	UHF Fine Tuning
Knob	52-1194-0	Volume
Knob	52-1196-0	Brightness, Vert. Hold, Horiz. Hold, Contrast
Knob	52-1197-0	Tone
Knob	67-659-0	VHF Dial Indicator, Models 160, 160-5, 162, 162-5
Knob	67-652-0	VHF Dial Indicator, Models 184, 184-5, 186, 186-5, 164, 164-5
Knob	52-924-0	UHF Dial Indicator
Pushbutton	84-7506	Assembly, Power Tuning
Pushbutton	84-7505	Assembly, Off-On
Cabinet	42-155-0	Mahogany, Models 184, 184-5
Cabinet	42-156-0	Fruitwood, Models 186, 186-5
Cabinet	42-154-0	Mahogany, Models 164, 164-5
Cabinet	42-149-0	Mahogany, Models 180, 180-5
Cabinet	42-150-0	Blond, Models 182, 182-5
Cabinet	42-128-0	Mahogany, Models 160, 160-5
Cabinet	42-138-0	Blond, Models 162, 162-5
Cabinet Leg	49-484	Blond, Models 162, 162-5
Cabinet Leg	49-476	Models 160, 160-5

WIRING DATA

High Voltage Lead	Use BELDEN No. 8869
Shielded Hook-up Wire	Use BELDEN No. 8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No. 8874
300Ω Tuner Input Lead	Use BELDEN No. 8225
300Ω Antenna Lead-in	Use BELDEN No. 8230 or 8275
Antenna Rotor Cable	Use BELDEN No. 8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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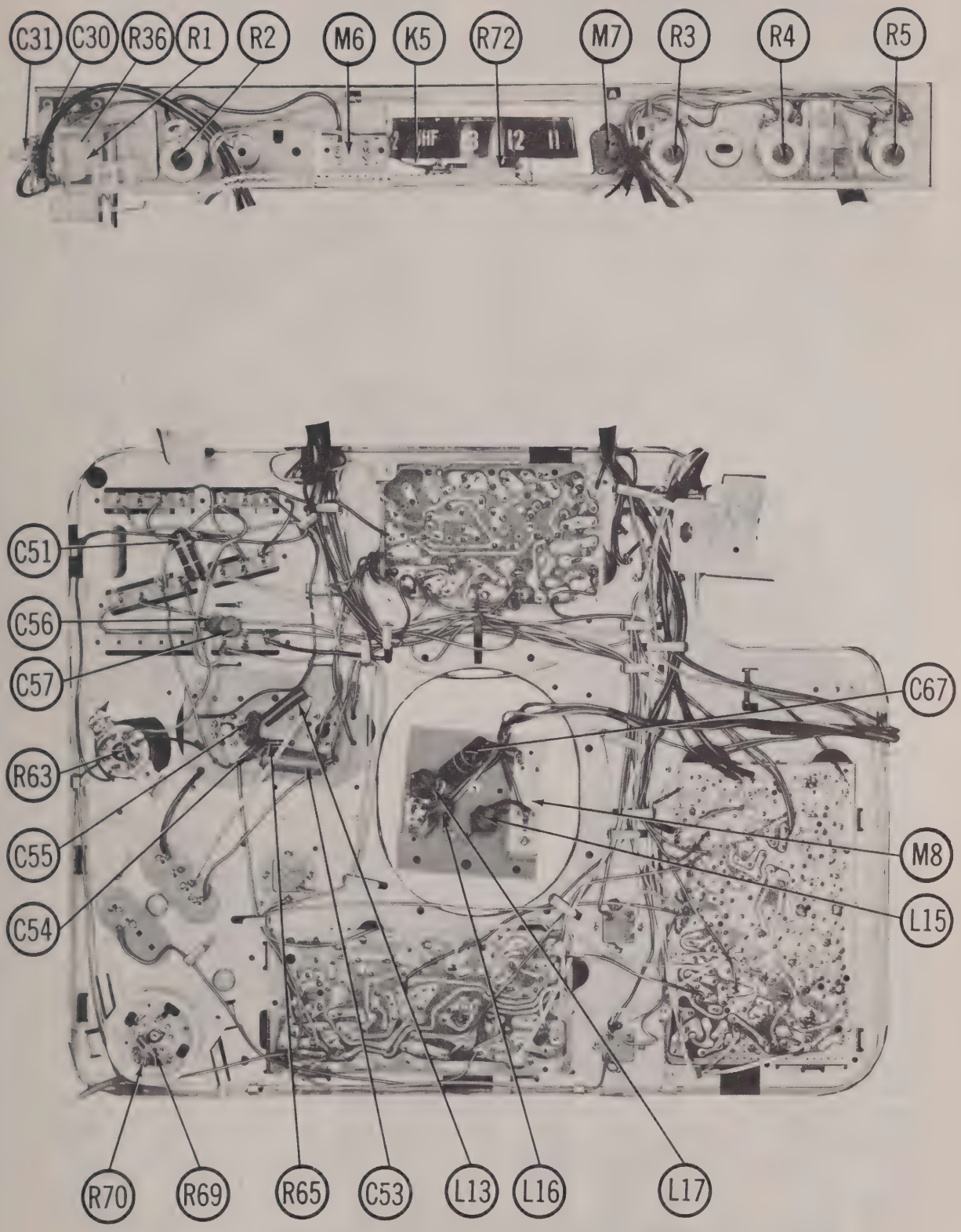
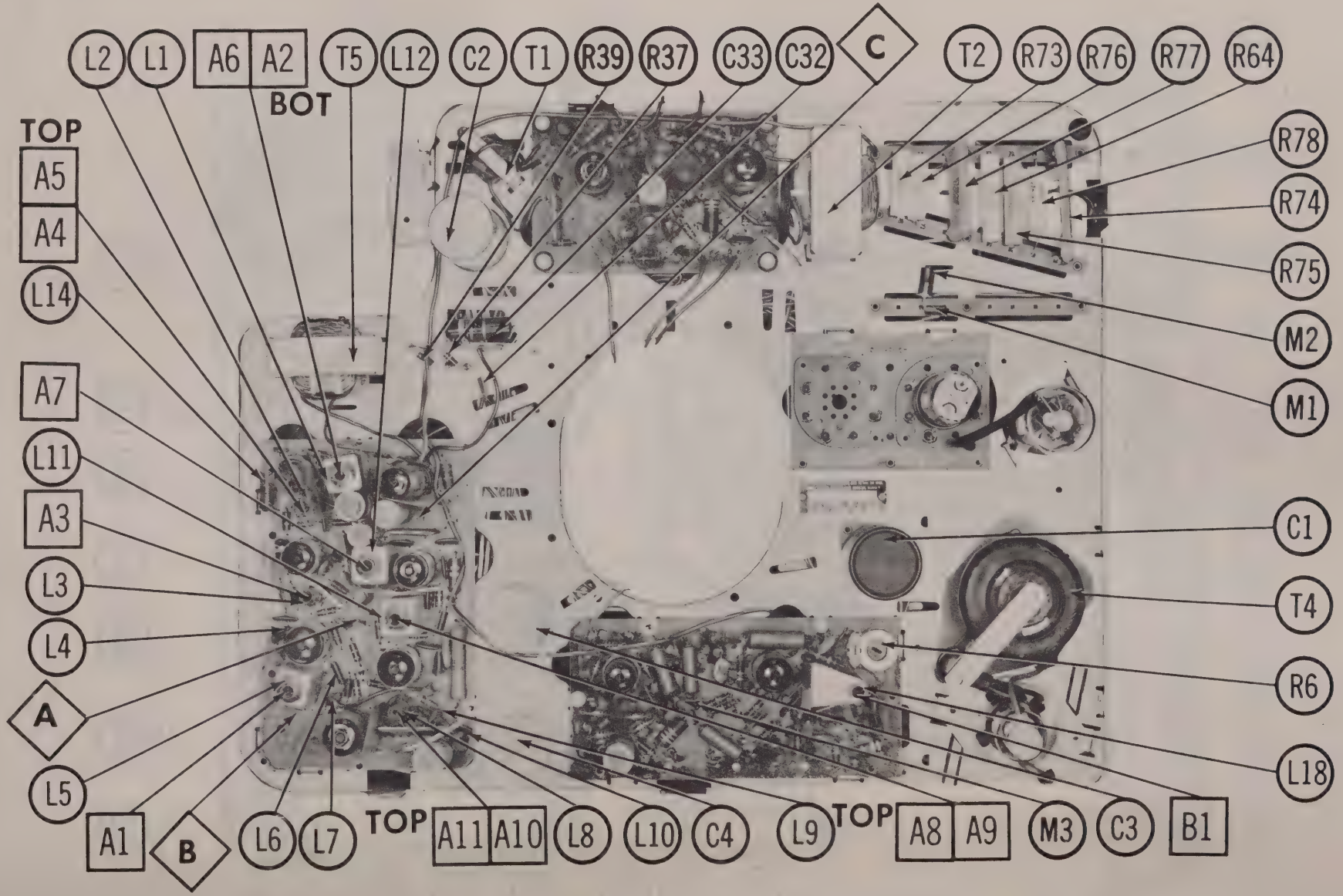
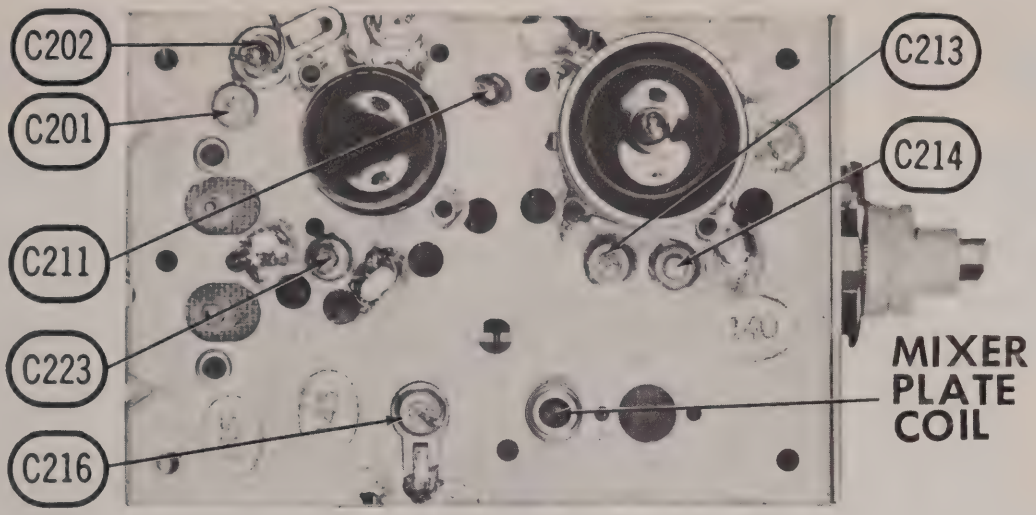
UHF TUNER 95-193-0

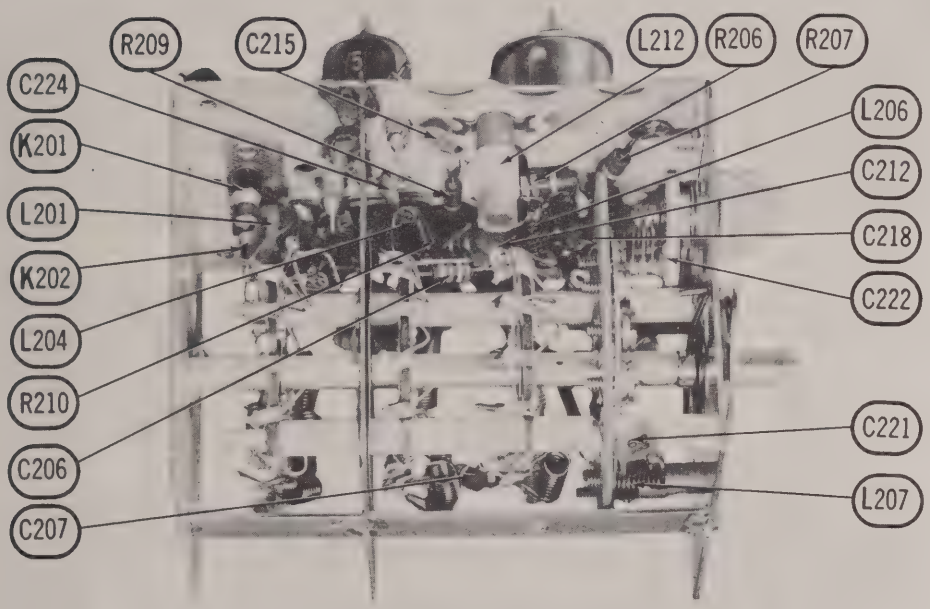


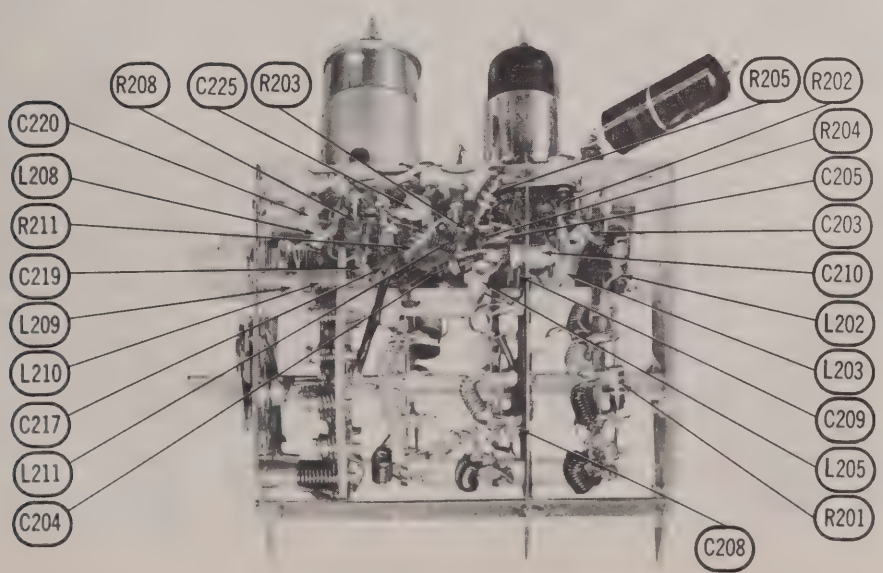
CHASSIS BOTTOM VIEW



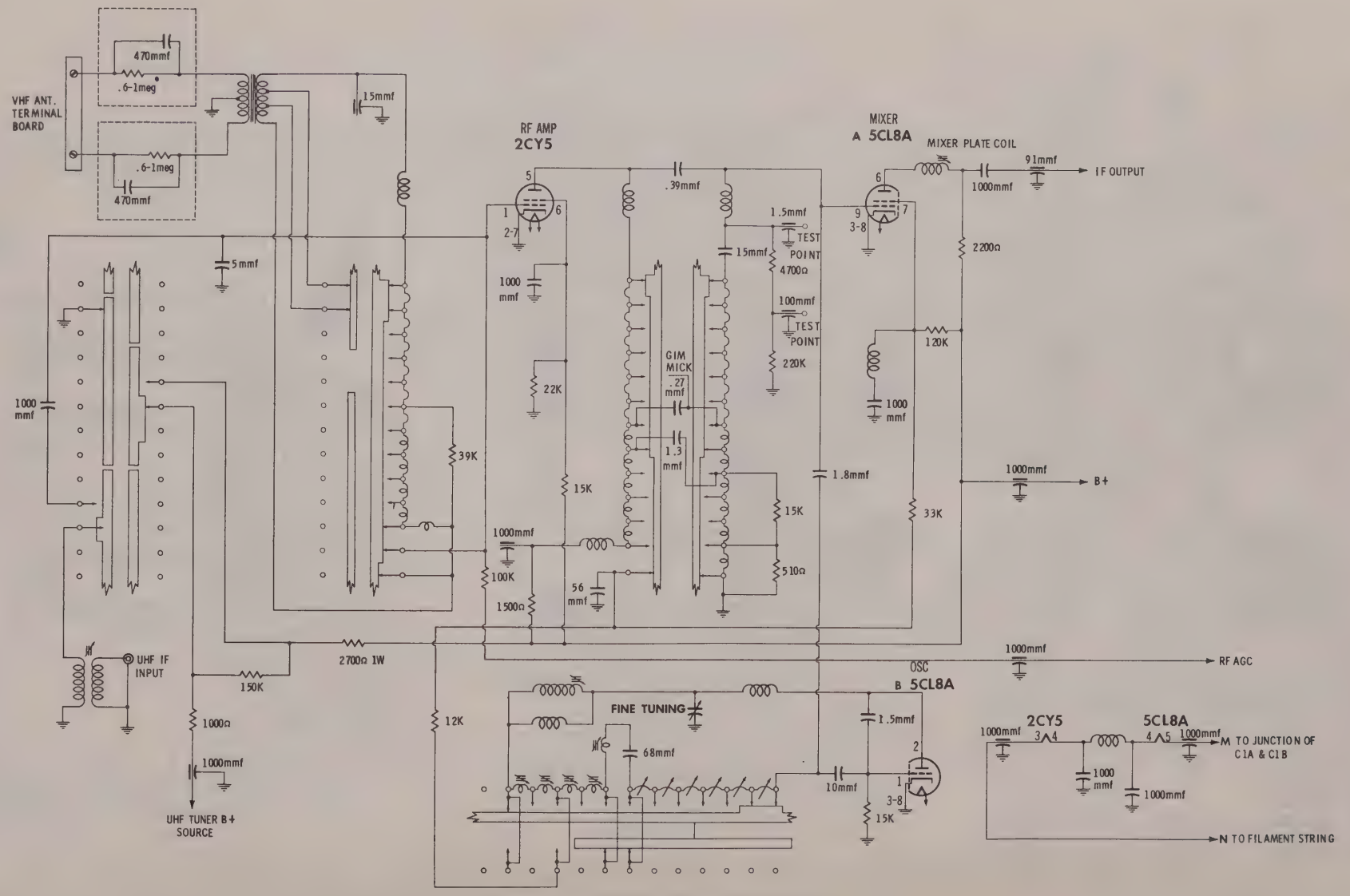
CHASSIS TOP VIEW







TUNER 95-189-0



CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION

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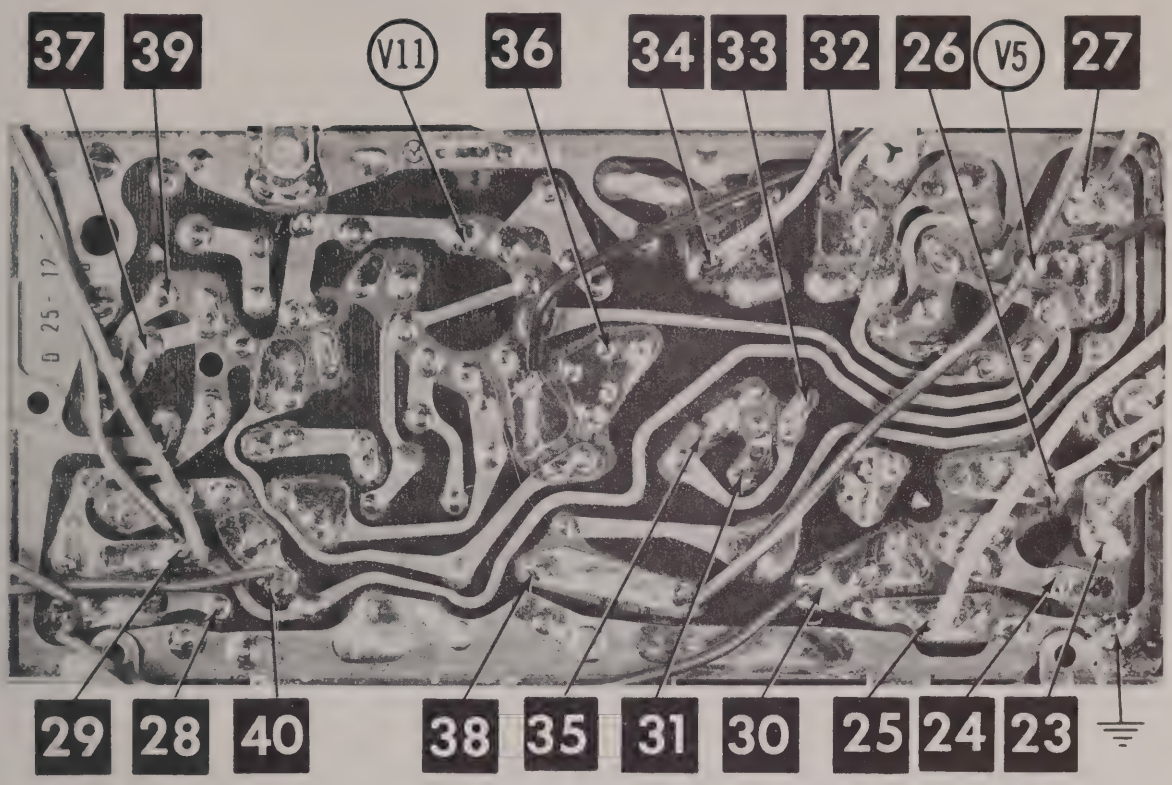
VHF TUNER with UHF provisions 95-190-0

CircuiTrace Numbers 23 thru 40



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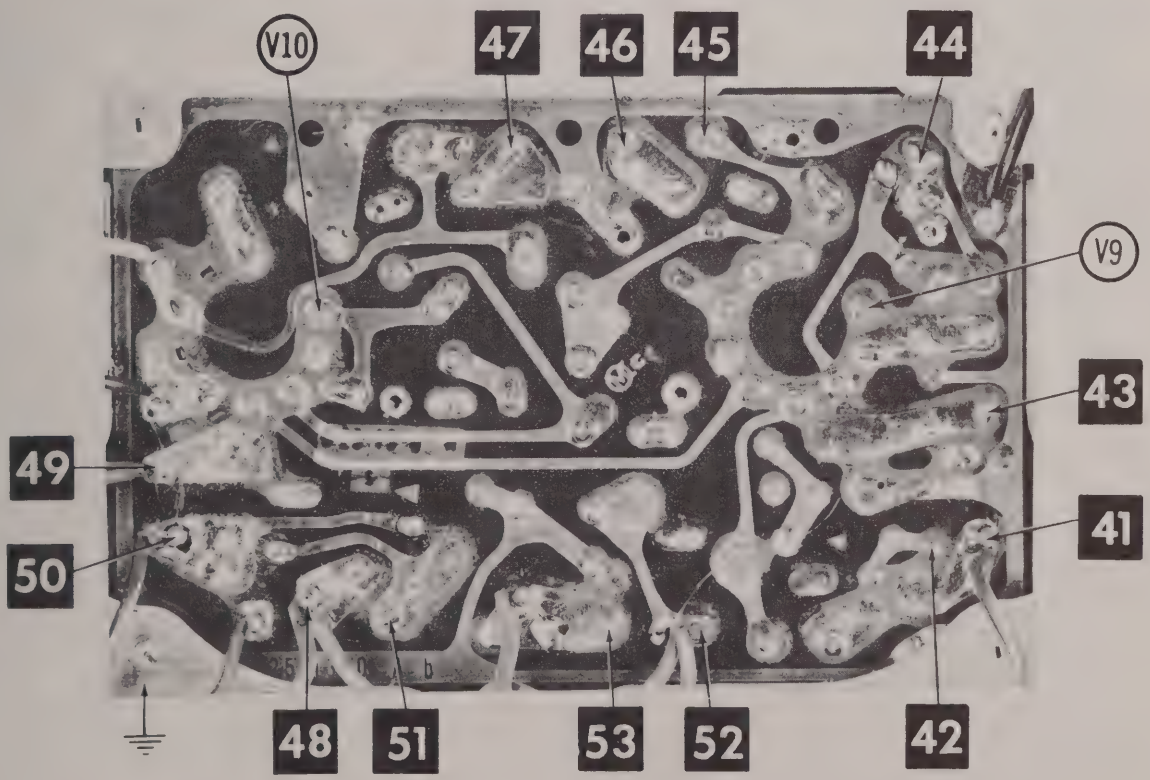
HORIZONTAL
PRINTED BOARD

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED

CircuiTrace Numbers 41 thru 53



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VERTICAL
PRINTED BOARD

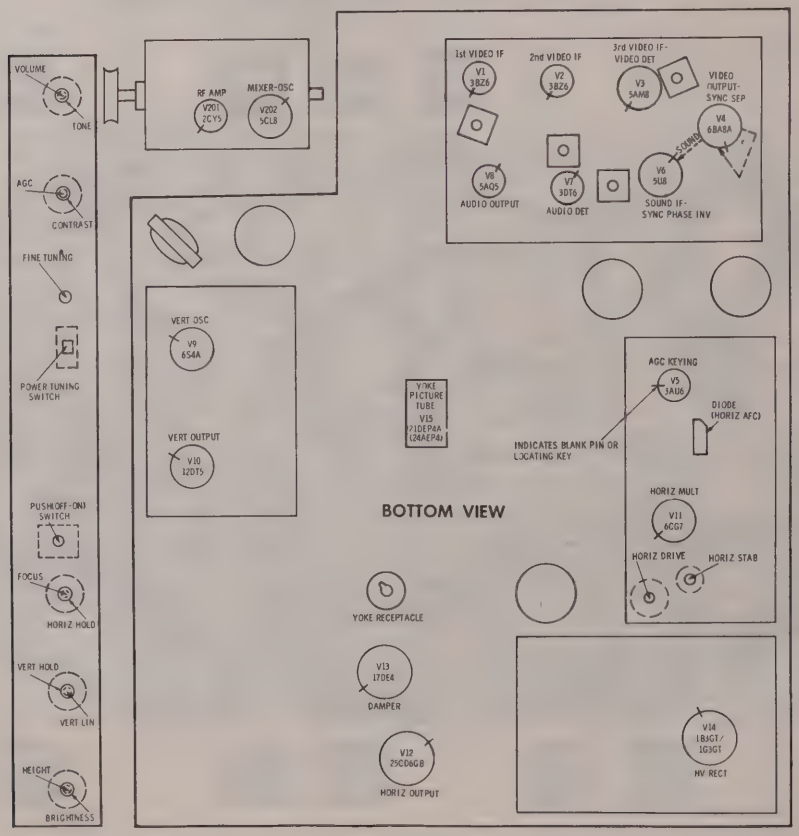
ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED

RESISTANCE MEASUREMENTS

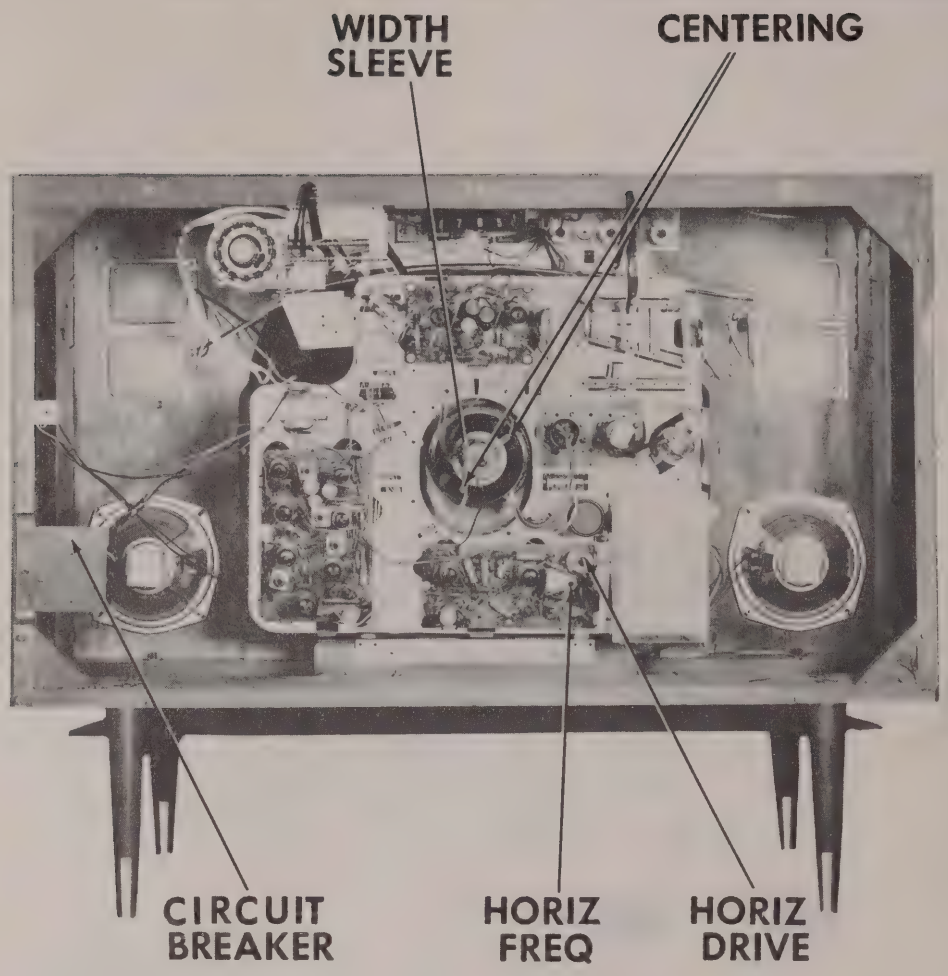
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	3BZ6	61K	56Ω	2Ω	2.5Ω	†4000Ω	†4000Ω	0Ω		
V2	3BZ6	57K	56Ω	2.5Ω	3Ω	†4000Ω	†4000Ω	0Ω		
V3	5AM8	220Ω	.2Ω	†3500Ω	3Ω	4.5Ω	†3500Ω	.1Ω	4700Ω	0Ω
V4	6BA8A	0Ω	2.2meg	†470K	6Ω	4.5Ω	•15Ω	4700Ω	†4700Ω	†5200Ω
V5	3AU6	†53K	†510Ω	11Ω	11.5Ω	275K	ǂ78K	†510Ω		
V6	5U8	†10K	4Ω	†72K	6Ω	7Ω	†4700Ω	220Ω	2700Ω	†470K
V7	3DT6	5.2Ω	680Ω	7Ω	8Ω	ǂ710K	†22K	560K		
V8	5AQ5	0Ω	220Ω	8Ω	9.5Ω	†1300Ω	†1100Ω	0Ω		
V9	6S4A	NC	235Ω	•1.5meg	13Ω	14.5Ω	•1.5meg	NC	NC	•†4.2meg
V10	12DT5	†330Ω	NC	•1.3meg	14.5Ω	16.5Ω	• 1.3meg	150Ω	NC	†965Ω
V11	6CG7	†7000Ω	2.8meg	820Ω	11Ω	9.5Ω	†56K	•130K	820Ω	NC
V12	25CD6GB	NC	16.5Ω	0Ω	NC	470K	TP	20Ω	†8600Ω	TOP CAP †8Ω
V13	17DE4	NC	NC	¶170K	NC	†120Ω	NC	20Ω	26Ω	
V14	1B3GT/ 1G3GT	PINS	1 THRU 8	HAVE	INFINITE	RESISTANCE				TOP CAP †460Ω
V15	21DEP4A	13Ω	82K	ǂ22K	•ǂ50K	NC	82K	•500K	11.5Ω	
V201	2CY5	1meg	0Ω	2Ω	1.5Ω	†4000Ω	†15K	0Ω		
V202	5CL8	15K	†20K	0Ω	1.5Ω	0Ω	†4700Ω	†29K	0Ω	225K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM 280V SOURCE.
ǂ MEASURED FROM PIN 3 OF V13.

NC NO CONNECTION
TP TIE POINT



TUBE PLACEMENT CHART



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a station, preferably with a test pattern.

Set the Horizontal Hold control at the center of its range and adjust the Horizontal Frequency slug (B1) until the picture synchronizes horizontally.

Check horizontal sync on other channels and if necessary, retouch B1 for best sync on all channels.

Turn Horizontal Drive (R6) clockwise until drive lines (bright vertical bars running vertically on the left side of the screen) appear on screen. Slowly turn counterclockwise until drive lines just disappear. If necessary, repeat adjustment of B1.

SERVICING IN THE FIELD

SAFETY GLASS REMOVAL

Remove 2 screws holding mask at bottom edge. Tilt mask out at bottom and lower to remove.

FUSE DEVICE

A Circuit Breaker is used for low voltage power supply protection, and may be reset by depressing the reset button. (For location, see "Tube Placement Chart".)

TUNER OSCILLATOR ADJUSTMENTS

To touch-up the VHF Oscillator, it is necessary to remove the rear cover.

AGC

The AGC may be varied by means of an AGC control. (For location, see "Tube Placement Chart".)

FOCUS

The focus may be varied by means of a Focus control. (For location, see "Tube Placement Chart".)

HORIZONTAL OSCILLATOR FIELD ADJUSTMENTS

Coarse adjustment of the Horizontal Hold is accomplished by the proper setting of the Horizontal Frequency slug. (For location, see "Tube Placement Chart".)

WIDTH

The width may be varied by adjusting a metallic sleeve, located between the yoke and the picture tube neck, in or out of the yoke.

HORIZONTAL DRIVE

The horizontal drive may be varied by a Horizontal Drive control. (For location, see "Tube Placement Chart".)

CENTERING

Centering is accomplished by 2 magnetic rings, located behind the yoke, on the neck of the picture tube.

PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

**BELL SOUND MODEL T-238
(Ch. T-233, RP-220)**

**BELL SOUND MODEL T-238
(Ch. T-233, RP-220)**

GENERAL INFORMATION

Bell Model T-238 stereo tape recorders have piano-key controls for each mode of operation.

Three 4-pole motors control the tape without the need for belts, pulleys, clutches, or mechanical brakes.

Electro-Dynamic braking instantly stops the tape without straining or breaking it. An automatic stop turns off the motor after the end of the tape has passed through the unit.

The Model T-238 recorder consists of a T-233 stereo tape transport and two RP-220 preamplifiers which will record quarter-track stereo and four quarter-track monaural recordings at 3 3/4 ips. Quarter-track and half-track stereo, and monaurally recorded tape may be played back at either 3 3/4 or 7 1/2 ips.

The Model T-238 tape recorder has two tape speeds — 7 1/2 and 3 3/4 ips. With four tracks, recording times are as follows:

Reed Size	3 3/4" Speed
5" (600 ft.)	2 hours
7" (1200 ft.)	4 hours
7" (2400 ft. of 1/2-mil mylar tape)	8 hours

This tape recorder operates from a 60 cycle, 110-120 volt AC supply only.

Manufactured by:

Bell Sound Division
Thompson Ramo Wooldridge Inc.
555 Marion Road
Columbus 7, Ohio

This material compiled and published by

HOWARD W. SAMS & CO., INC., INDIANAPOLIS 6, INDIANA

C405

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PREPARING FOR OPERATION

1. Remove lid of carrying case.
2. Make necessary connections to amplifier and speakers.
3. Depress Stop key. This opens head assembly so that tape can be inserted.
4. Turn Record-Playback switch to Playback.
5. Plug power cord into any convenient receptacle of the proper rating.

FUNCTION OF CONTROLS

Stop Key

Depressing this key stops the tape at any time.

Forward Key

Depressing this key advances the tape rapidly from the supply to the take-up reel.

Rewind Key

Depressing this key rewinds the tape rapidly from the take-up to the supply reel.

Run Key

Depressing this key starts the tape in motion in Playback and Record.

3.75 and 7.5 Keys

Depressing either key selects the speed of the tape transport.

2T-4T Switch

When switch is in the 2T position, the heads are set for half-track, or conventional, tape. When switch is in the 4T position, the heads are set for quarter-track tape.

Record-Playback Switch

Turning this switch counterclockwise puts the unit in Playback; clockwise, in Record.

Volume

Turning this control clockwise increases the volume; counterclockwise, decreases the volume.

On-Off Switch

This switch turns the power on or off to the unit.

OPERATING INSTRUCTIONS

Threading Tape

1. Depress Stop key. This opens head assembly.
2. Place a full reel of tape on left (supply) reel, making certain that reel slots engage protrusions on left platform. Place an empty reel on right (take-up) reel, making certain reel slots engage protrusions on right platform.
3. Unwind approximately 14 inches of tape from supply reel. Hold it taut and insert it into tape slot. Make sure the dull-coated side faces the heads.
4. Insert free end of tape into one of three slots in hub of take-up reel. Hold tape in place and turn the reel two or three times until tape is secured to reel.

To Record from Microphone, Radio Tuner, Record Changer, or Tape Output from Another Amplifier (Monaural)

1. Turn On-Off switch to On, and allow unit to warm up.
2. Thread tape (see "Threading Tape").
3. Turn 2T-4T switch to 4T.
4. For live recordings, plug microphone into mike input jack of left-channel preamplifier. To record from player, radio tuner, or tape output from another amplifier, insert interconnecting leads into radio input jack of left-channel preamplifier.
5. Depress the 3.75 key.
6. Turn Record-Playback switch on left-channel preamplifier, clockwise to Record. Red pilot light will glow while the unit is in Record.
7. Depress Run key to operate tape transport.
8. Adjust volume until cathode-ray indicator is almost half-closed. This is an average reading level.
9. After recording is finished, turn Selector switch to Playback and depress Stop key.
10. Remove full reel of tape from take-up platform and turn it over. Then place it on supply platform.
11. Repeat Steps 2 through 10.
12. Repeat Steps 2 and 3.

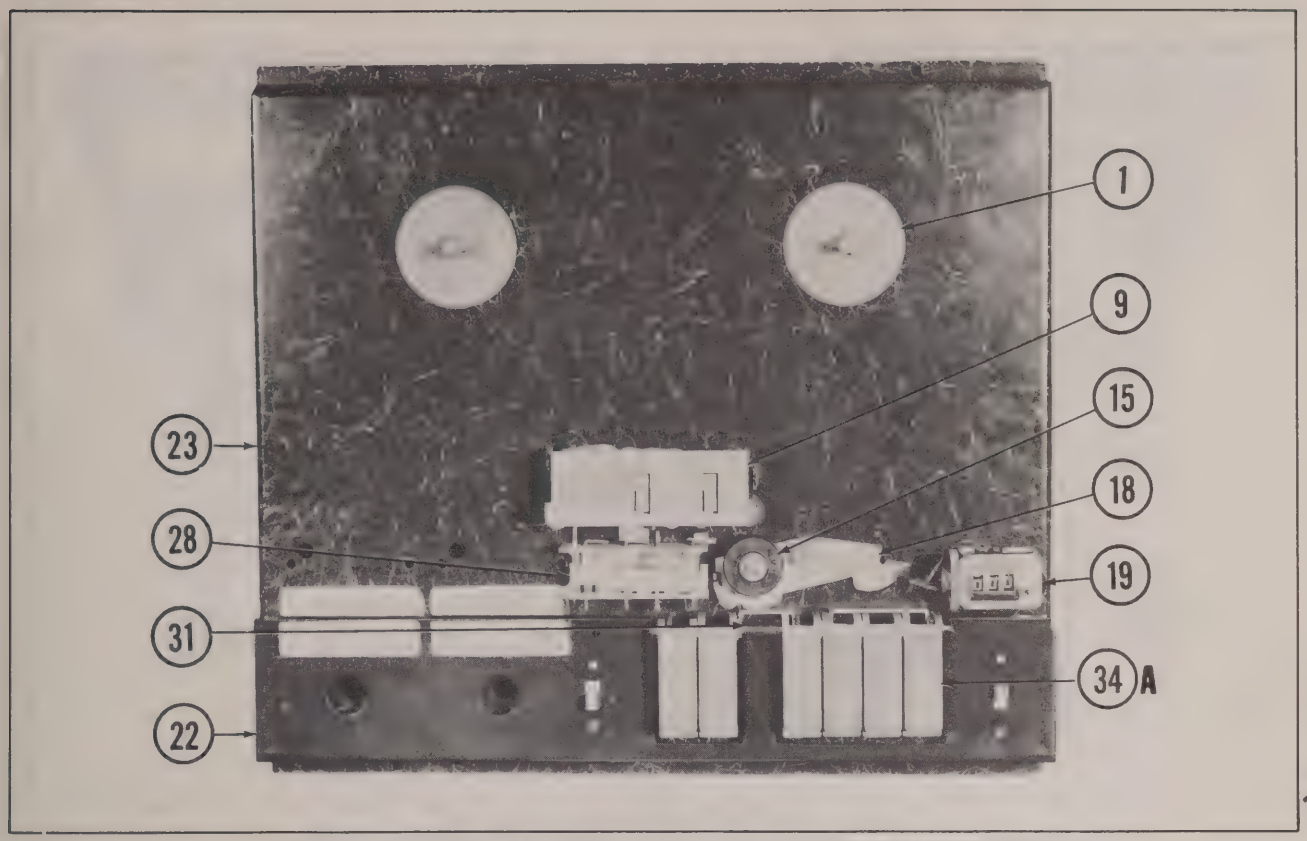


FIG. 1 TOP VIEW OF MECHANISM WITH ESCUTCHEON REMOVED

13. For live recordings, plug microphone into mike input jack of right-channel preamplifier. To record from record player, radio tuner, or tape output from another amplifier, insert interconnecting leads into radio input jack of right-channel preamplifier.

14. Depress the 3.75 key.

15. Turn Record-Playback switch on right-channel preamplifier clockwise to Record. Red pilot light will glow while unit is in Record.

16. Repeat Steps 7 through 10.

17. Repeat Steps 2, 3, 13, 5, 15, 7, 8, and 9.

18. After Step 17 has been completed, the tape will contain four quarter-tracks of monaural recordings.

NOTE: Before changing functions, always depress the Stop key.

To Record Stereo

1. Place two microphones in front of material to be recorded. They should be at least six feet apart.

2. Plug left microphone into left RP-220 preamplifier; plug right microphone into right RP-220 preamplifier.

3. Turn 2T-4T switch to 4T.

4. Depress 3.75 key.

5. Turn Playback-Record switch clockwise to Record.

6. Depress the Run key.

7. Set the two level controls on the RP-220 preamplifiers until the fluctuations of the two corresponding cathode-ray level indicators are as nearly alike as possible.

To Erase Tape

When the Record-Playback switch is turned to Record, the erase head is automatically positioned, so that any previous recordings are erased while a new one is being made. Material no longer needed can be erased, without recording, by turning the Record-Playback switch to Record, depressing the Run key, and turning the Volume control to minimum. To erase the three remaining tracks, reverse the reels and repeat this procedure.

To Play Recordings

1. Thread tape (see "Threading Tape").

2. Turn 2T-4T switch to 2T for half-track tapes and to 4T for quarter-track tapes.

3. Depress 3.75 or 7.5 key, depending upon speed at which tape was recorded.

4. Turn Record-Playback to Playback, and depress Run key. Be sure this switch is in Playback before depressing the Run key. Otherwise, the tape will be erased.

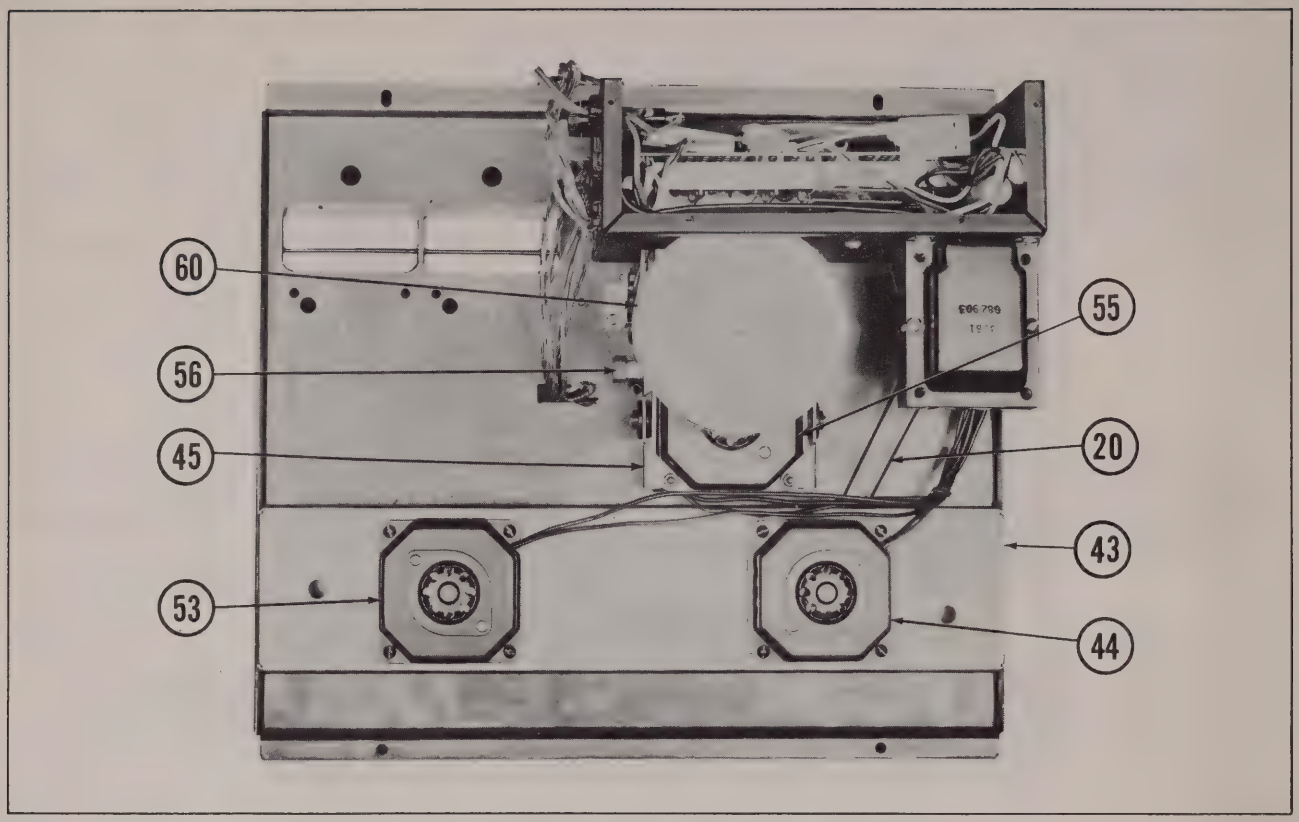


FIG. 2 BOTTOM VIEW OF MECHANISM

DISASSEMBLY

To Remove Unit from Case

1. Remove four screws; two at rear and two at front of case.
2. Lift unit straight up and out of case.
3. To reassemble, reverse the foregoing procedure.

To Remove Amplifiers from Tape Transport Mechanism

1. Remove three screws holding the front trim strip.
2. Remove four screws, two on each side holding the cover plate.
3. Remove the screw in the left corner of the Gold Decorative Panel.
4. Remove Grip Ring on Piano Key Shaft and remove the shaft and keys.
5. Remove the two Play-Record Panels.
6. Remove the two hex nuts from the function control shafts.
7. Remove the AC supply cords from the Tape Transport power supply.
8. Unplug the heads from the sockets on the amplifiers.
9. Remove four screws from the top of the Tape Transport Mechanism holding the amplifiers to the tape deck.
10. Remove the four screws at the rear of the Tape Transport Mechanism holding the amplifiers to the tape deck.
11. Remove amplifiers from tape deck.
12. To reassemble, reverse the foregoing procedure.

MECHANICAL ADJUSTMENTS

Reel Platform

Reel platforms (1) must clear the deck plate by not less than 1/ 32 inch, nor more than 1/ 16 inch. Also, their heights must be the same. To adjust the height, loosen set screw (2) and position reel platforms (1). After adjusting, tighten set screw (2).

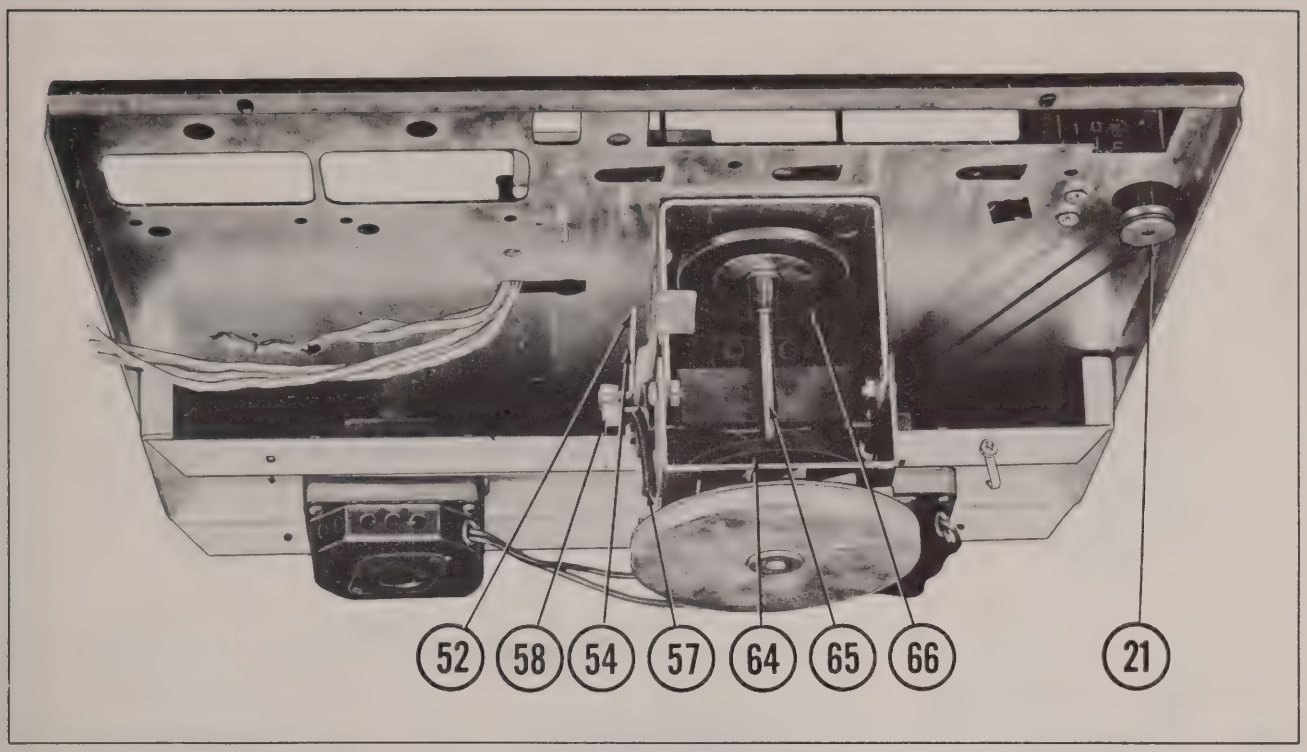


FIG. 3 BOTTOM VIEW OF MECHANISM WITH AMPLIFIER REMOVED

LUBRICATION

Lubricants applied during manufacture will last for a long time. However, if parts are replaced, or after each 1,000 hours of operation, lubricate as follows:

1. Apply one drop of #10 motor oil to top and bottom bearing of take-up motor (44) and rewind motor (53).

2. Apply one drop of #10 motor oil to top and bottom bearings of capstan motor (55).

CAUTION: Be certain that no oil seeps onto motor pulleys.

3. Apply one drop of #10 motor oil to top and bottom capstan bearings.

CAUTION: Be certain no oil seeps onto drive pulleys (64) and (66), or onto any part of the capstan shaft extending above the top deck plate.

4. Apply one drop of #10 motor oil to pressure roller (15) bearing.

NOTE: Only a small amount of oil is needed on each bearing. It is better to use too little oil rather than too much. Oil on running surfaces, between motor pulleys and rubber idlers, could cause poor drive or no drive at all, as well as excessive wow and flutter.

CLEANING

Capstan shaft, pressure roller (15), support guide post (37), support post (38), record-playback heads (10), and (11), and erase tape head (12) may accumulate tape coating oxide which is worn off tape as it passes these parts. Clean these parts with head cleaning solvent or with petroleum solvent. Never use cleaning fluids on the capstan shaft, because the fluid may run down the shaft and into the bearings.

CAUTION: Never clean record-playback heads (10) and (11) or erase head (12) with a metal object because they could be damaged.

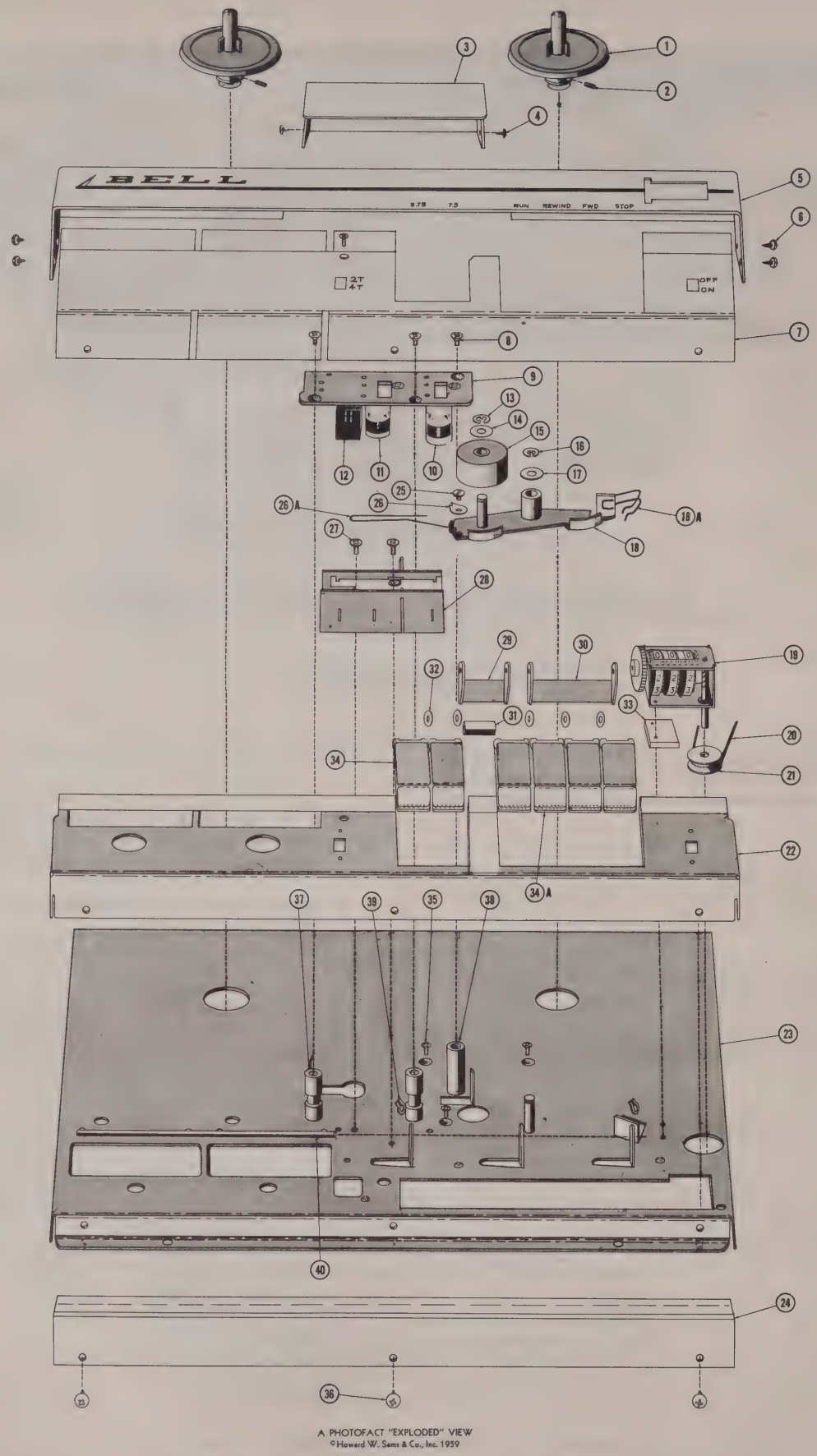


FIG. 4A EXPLODED VIEW OF PARTS ABOVE DECK PLATE

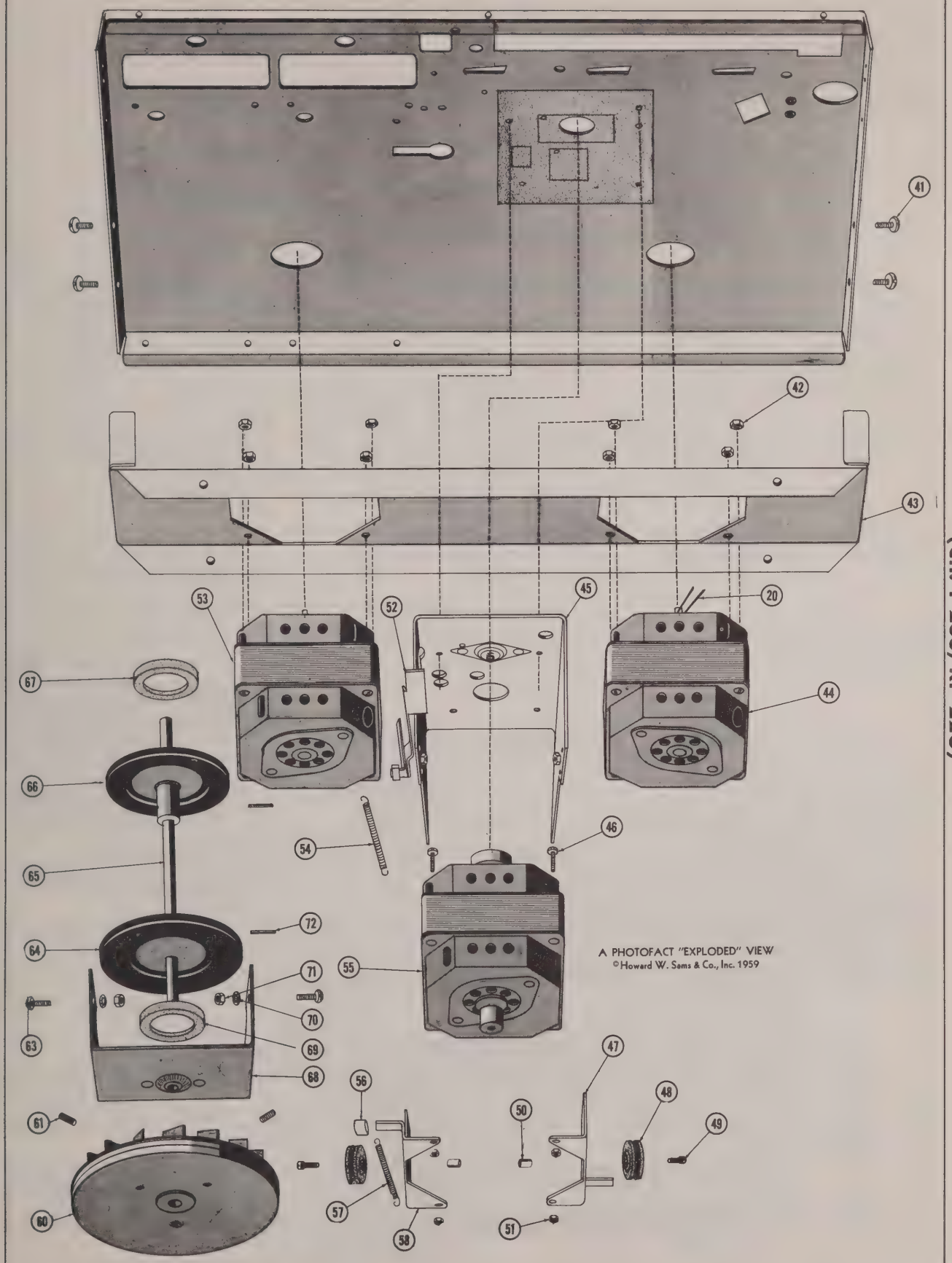


FIG. 4B EXPLODED VIEW OF PARTS BELOW DECK PLATE

TROUBLE CHART

Symptom	Cause	Remedy
Poor tape drive in Playback and Record.	1. Oil or grease on driving surfaces of drive pulley (64) or (66), and on upper pulley on capstan motor (55).	1. See "Cleaning".
	2. Oil, grease, or tape coating oxide on pressure roller (15) and on upper portion of capstan shaft.	2. See "Cleaning".
No tape drive at 7 1/2-ips speed in Playback and Record.	1. Motor spring (57) disconnected or missing.	1. Replace motor spring (57).
Take-up reel will not take up tape in Playback or Record.	1. Loose set screw (2) in reel platform (1) — reel platform (1) slips on motor shaft.	1. Tighten set screw (2).
No rewind.	1. Loose set screw (2) in supply reel platform — reel platform slips on rewind motor shaft.	1. Tighten set screw (2).
Tape rubs against edge of reels.	1. Reel platforms need adjusting.	1. See "Reel Platform" under "Mechanical Adjustments".
	2. Loose rewind-take-up motor mounting bracket.	2. Tighten the two screws on each end of deck plate.
Tape spills during Rewind or Fast Forward.	1. Memory switch needs adjusting.	1. Remove electrical chassis cover of tape transport. Place memory switch so that it will turn one way when Rewind key is depressed and the other way when Forward key is depressed.
Tape does not stop — Dynamic Brakes not functioning properly.	1. Weak selenium rectifier.	1. Replace selenium rectifier.
	2. R39 or R40 open.	2. Replace R39 or R40 .
Tape spills during Rewind when Stop key is depressed.	1. R 39 open.	1. Replace R39 .
Tape spills during Fast Forward when Stop key is depressed.	1. R 40 open.	1. Replace R40 .

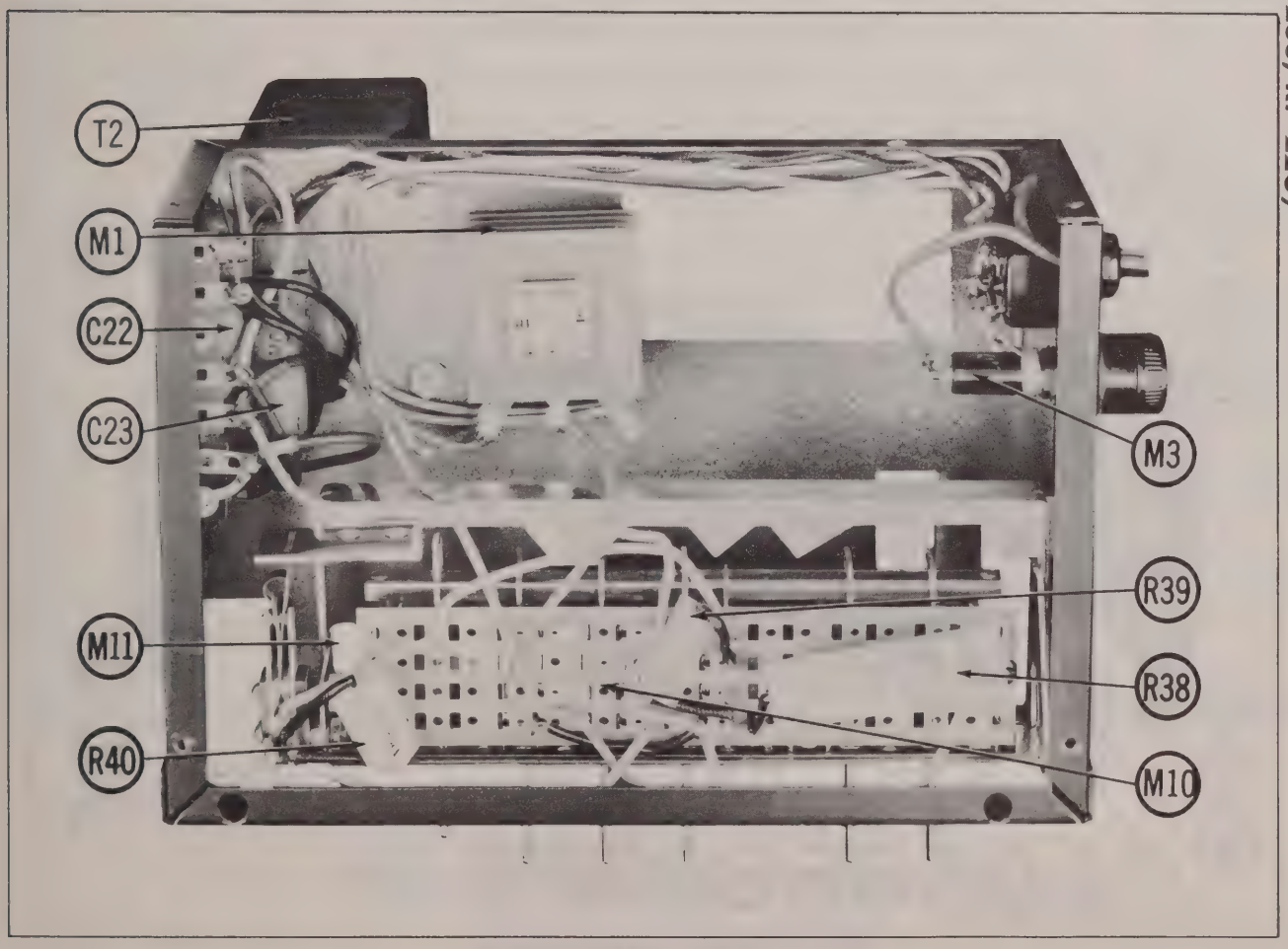
MECHANICAL PARTS LIST

Ref. No.	Part No.	Description
1	83B10	Reel Platform (2)
2		Set Screw, Stl. Pl. 8-32 x 3/16 Cup Pt.
3	72B31	Head Cover
4		Screw
5	72C32	Cover Plate
6		Screws
7	72C205	Decorative Panel (Gold)
8		6-32 x 3/8 PH. FHMS STL. PL. Screws
9	71A13	Head Support Plate
10	36B1	Stacked Playback Head, $\frac{1}{2}$ Track
11	36B7	Stacked Record-Playback Head, 1/4 Track
12	36B8	Stacked Erase Head, 1/4 Track
13	A23822	Retaining Ring
14	B20089P71	Felt Washer
15	83A4	Pressure Roller
16	A23822	Retaining Ring
17	B20089P71	Felt Washer

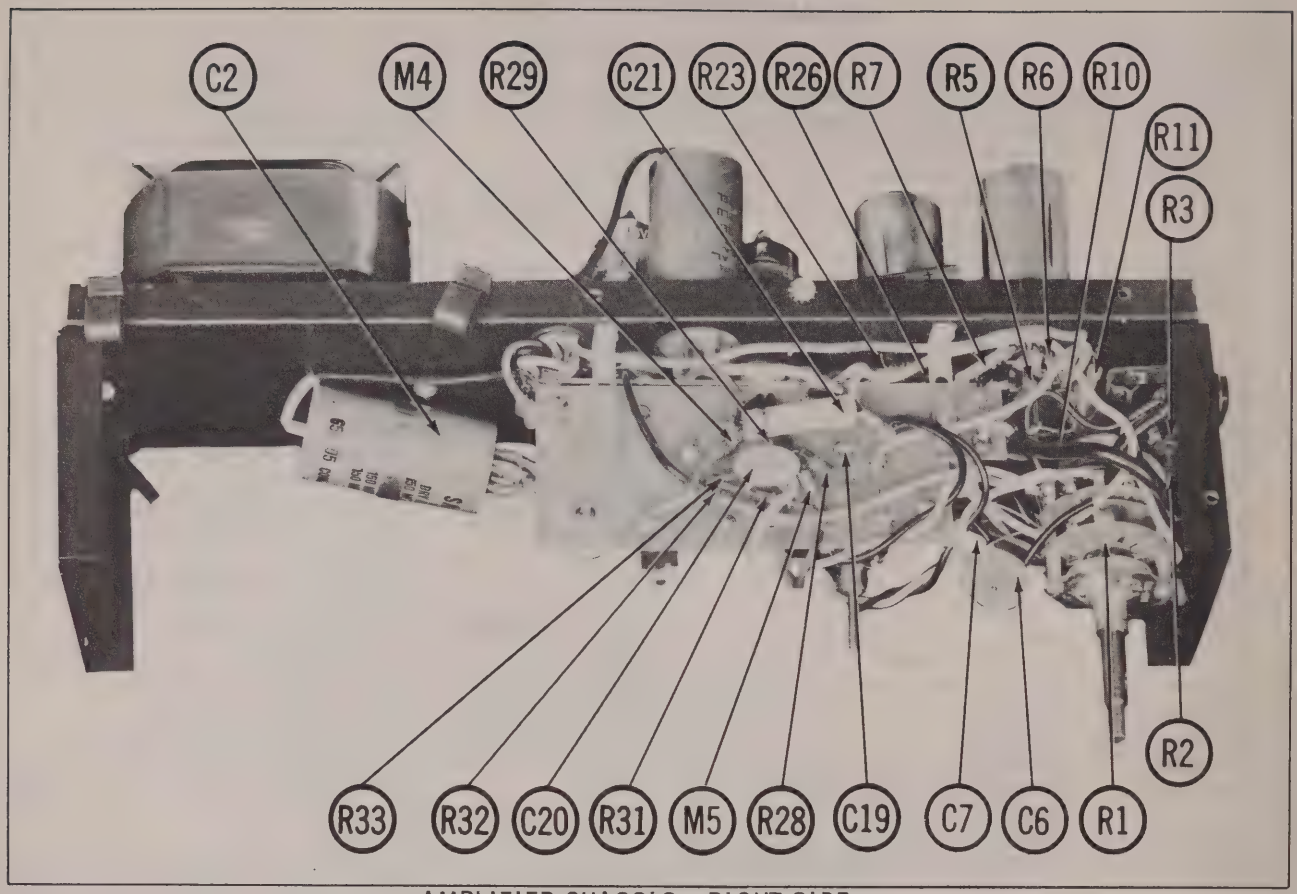
MECHANICAL PARTS LIST (CON'T.)

Ref. No.	Part No.	Description
18	91A40	Pressure Roller Actuator Ass'y.
18A	77A11	Actuator Arm Spring
19	46B1	Program Indicator
20	83A19	Counter Drive Belt
21		Part of item 19
22	72D37	Deck Control Panel
23	72D35	Deck Chassis
24	78B97	Trim Strip
25		Screw
26		Retainer
26A	77A9	Toggle Spring
27		Screw
28	91B181	Pressure Pad Ass'y.
29	72A66	Key Coupler (Short)
30	72A65	Key Coupler (Long)
31	75A9	Key Spacer
32		Washer
33	71A19	Counter Mtg. Plate
34	83A12	Modified Key (3 3/4 ips only)
34A	83A9	Piano Key
35		Screw
36		Trim Strip Screw
37	75A6	Support Guide Post
38	75A7	Support Post
39		Grip Ring
40	76A2	Key Shaft
41		Motor Mtg. Bracket Screws.
42		6-32 Hex Nut
43	72C135	Motor Mtg. Bracket

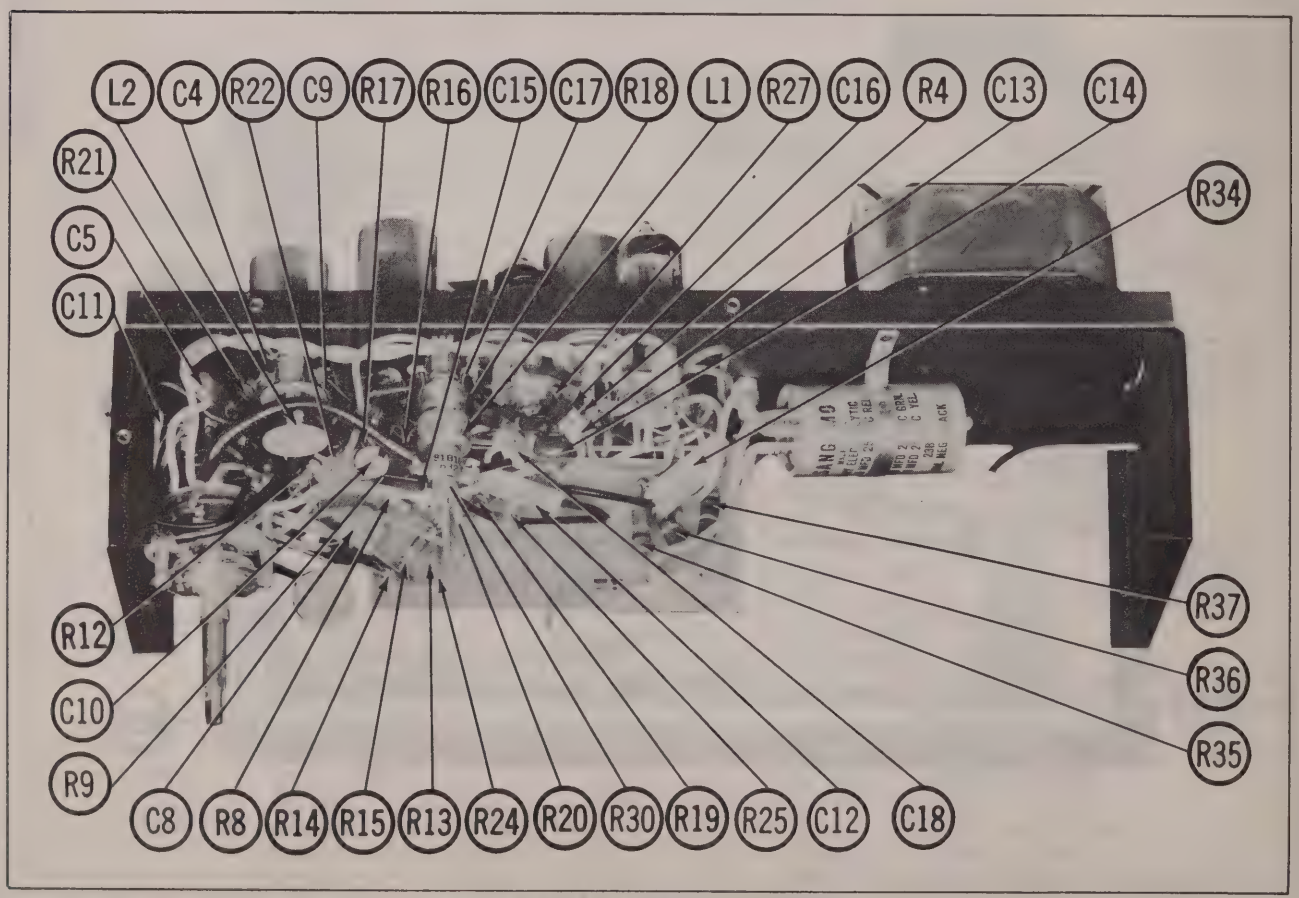
Ref. No.	Part No.	Description
44	35B4	Take-up Motor
45		Capstan Motor Housing
46		Capstan Motor Mtg. Screws
47	A25382	Capstan Motor Support
48	B20029P41	Grommet
49		6-32 x 3/8 Fil. Hd. Mach. Screw
50	B20025P23	Spacer (2)
51		Hex Nut
52	A25392	Capstan Lever
53	35B5	Rewind Motor
54	A25397P1	Motor Spring
55	91B53	Capstan Motor Ass'y. (G.I.)
	91C159	Capstan Motor Ass'y. (Alliance)
56	83A11	Rubber Bumper (2)
57	A25397P2	Motor Spring
58	A25382	Capstan Motor Support
60	A25259	Flywheel
61		Set Screw
63		#8-32 x 3/8 Phillips Hd. Mach. Screw
64	A25396P2	Drive Pulley, 3 3/4
65	76A3	Capstan Shaft
66	A25396P1	Drive Pulley, 7 1/2
67	A25405P2	Felt Washer
68	B25381	Capstan Yoke
69	A25405P2	Felt Washer
70		Lockwasher
71		#8-32 Hex Nut
72		Roll Pin



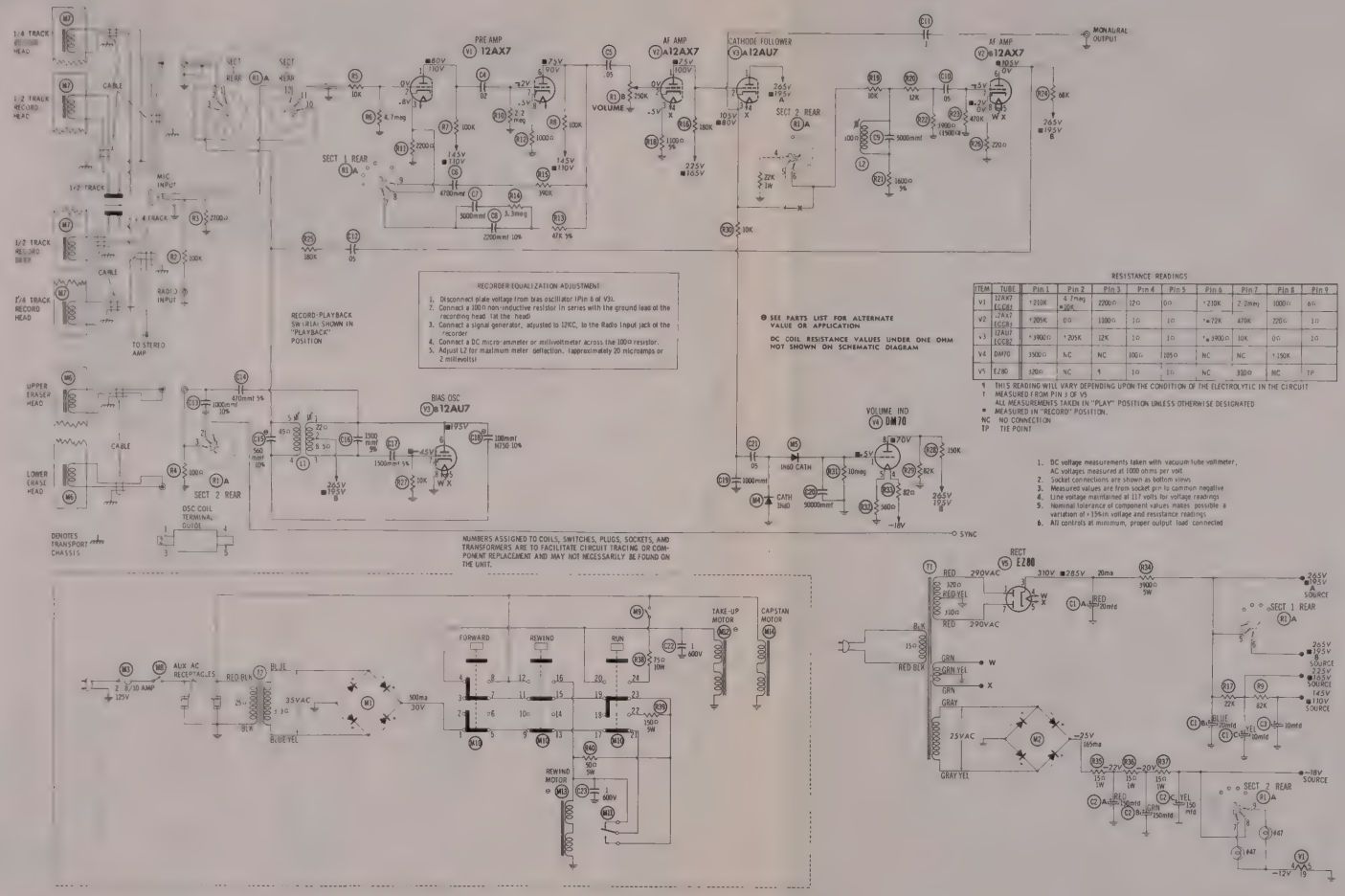
MOTOR CONTROL CHASSIS



AMPLIFIER CHASSIS - RIGHT SIDE



AMPLIFIER CHASSIS - LEFT SIDE


PRE AMP V1 12AX7
AF AMP V2 12AX7
CATHODE FOLLOWER V3 12AU7
AF AMP V7 12AX7
MONAURAL OUTPUT
VOLUME
1/4 TRACK RECORD HEAD
1/2 TRACK RECORD HEAD
1/4 TRACK RECORD HEAD
CABLE
MIC INPUT
RADIO INPUT
TO STEREO AMP
SECT 1 REAR
SECT 2 REAR
RECORD-PLAYBACK SWITCH SHOWN IN "PLAYBACK" POSITION
RECORDER EQUALIZATION ADJUSTMENT
1. Disconnect plate voltage from bias oscillator (Pin 6 of V3).
2. Connect a 100Ω non-inductive resistor in series with the ground lead of the recording head (at the head).
3. Connect a signal generator, adjusted to 12KC, to the Radio Input jack of the recorder.
4. Connect a DC micro-ammeter or millivoltmeter across the 100Ω resistor.
5. Adjust L2 for maximum meter deflection. (approximately 20 microamps or 2 millivolts)
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
RESISTANCE READINGS
ITEM | TUBE | Pin 1 | Pin 2 | Pin 3 | Pin 4 | Pin 5 | Pin 6 | Pin 7 | Pin 8 | Pin 9
V1 | 12AX7 ECC83 | +210K | 4.7meg *60K | 2200Ω | 12Ω | 0Ω | +210K | 2.2meg | 1000Ω | 0Ω
V2 | 12AX7 ECC83 | +205K | 0Ω | 1100Ω | 1Ω | 1Ω | +72K | 470K | 220Ω | 1Ω
V3 | 12AU7 ECC82 | +390Ω | +205K | 12K | 1Ω | 1Ω | +390Ω | 10K | 0Ω | 1Ω
V4 | DM70 | 350Ω | NC | NC | 100Ω | 1050Ω | NC | NC | +150K |
V5 | EZ80 | 320Ω | NC | ¶ | 1Ω | 1Ω | NC | 310Ω | NC | TP
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT
† MEASURED FROM PIN 3 OF V5
ALL MEASUREMENTS TAKEN IN "PLAY" POSITION UNLESS OTHERWISE DESIGNATED
* MEASURED IN "RECORD" POSITION.
NC NO CONNECTION
TP THE POINT
1. DC voltage measurements taken with vacuum-tube voltmeter.
AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views
3. Measured values are from socket pin to common negative
4. Line voltage maintained at 117 volts for voltage readings
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings
6. All controls at minimum, proper output load connected
UPPER ERASER HEAD
LOWER ERASE HEAD
BIAS OSC V3 12AU7
OSC COIL TERMINAL GUIDE
DENOTES TRANSPORT CHASSIS
VOLUME IND V4 DM70
SYNC
NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.
RECT V5 EZ80
AUX AC RECEPTACLES
FORWARD
REWIND
RUN
TAKE-UP MOTOR
CAPSTAN MOTOR
REWIND MOTOR
SECT 1 REAR
SECT 2 REAR

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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BELL SOUND MODEL T-238
(Ch. T-233, RP-220)

ELECT. PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Preamplifier	12AX7/ECC83	V4	Volume Indicator	DM70
V2	AF Amplifier	12AX7/ECC83	V5	Rectifier	EZ80
V3	Cath. Follower - Bias Osc	12AU7/ECC82			

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ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	Bell Sound PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	20	350	23B15	PRS3500	BBRD2245	TCS75	TDLD-28	TVA-2730	
B	20	350			BR1045	TC62	TD-10-450	TVA-1604	
C	10	350							
C2A	150	25	23B26	PR3-010					
B	150	25							
C	150	25							
C3	10	300	23B20	PRS1620	BR1045	TC62	TD-10-450	TVA-1604	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING			REPLACEMENT DATA						NOTES
	CAP.	VOLT	TOL	Bell Sound PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C4	.02	200		22B2	P288N-02	DD-203	CUB2S2	GEM-412	2TM-S2	
C5	.05	400		22B1	P488N-05	DD-503	CUB4S5	GEM-415	4TM-S5	
C6	4700			24A96	BPD-0047	DD-472	BYA10D47M	B-247	5HK-D47	
C7	5000			24A94	BPD-005	DD-502	BYA10D5	B-250	5HK-D50	
C8	2200		10%	24B17	DI-2200		PM6D22	GP222	10TS-D22	
C9	5000			24A94	BPD-005	DD-502	BYA10D5	B-250	5HK-D50	
C10	.05	400		28B9	P488N-05	DD-503	CUB4S5	GEM-415	4TM-S5	
C11	.1	200		28B10	P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C12	.05	400		28B4	P488N-05	DD-503	CUB4S5	GEM-415	4TM-S5	
C13	1000		10%	24B21	DI-1000	DD-102	PM6D1	GP210	10TS-D10	
C14	470		5%	21B2	1469-00047J		22R5T47	MCJ244	MS-347	
C15	560		10%	24A109	DI-560	DD-561	1R5T56	GP356	10TS-T56	①
C16	1500		5%	21B1	1464-0015J		1R5D15	MCE456	MS-215	
C17	1500		5%	21B1	1464-0015J		1R5D15	MCE456	MS-215	
C18	100		N750 10%	24B20	N750-DI 100	DTN-100	C10T1U	CN7-310	10TCU-T10	②
C19	1000			24B98	BPD-001	DD-102	BYA10D1	B-110	5HK-D10	
C20	50000			24B19	BPD-05	DD-503	CUB6S5	GP150	5HK-S50	
C21	.05	200		28B9	P288N-05	DD-503	CUB2S5	GEM-415	2TM-S5	
C22	.1	600		B20047P95	P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	
C23	.1	600		B20047P95	P688N-1	DF-104	CUB6P1	GEM-601	6TM-P1	

① Some versions may use 470mmf in this application.

② Some versions may use 150mmf in this application.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Bell Sound PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	Switch	½	18B1					Function Selector
B	250K				A47-250K	Q13-130	U441	Volume
C	Switch				RS-3/16	Not Req.	DS-37	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	100K	
R3	2700Ω	
R4	100Ω	
R5	10K	
R6	4.7meg	
R7	100K	
R8	100K	
R9	82K	
R10	2.2meg	
R11	2200Ω	
R12	1000Ω	
R13	47K 5%	
R14	3.3meg	

ITEM No.	RATING	REMARKS
R15	390K	
R16	180K	
R17	22K	
R18	1100Ω 5%	
R19	10K	
R20	12K	
R21	1600Ω 5%	
R22	3900Ω	(1500Ω) *
R23	470K	
R24	68K	
R25	180K	
R26	220Ω	
R27	10K	

ITEM No.	RATING	REMARKS
R28	150K	
R29	82K	
R30	10K	
R31	10meg	
R32	560Ω	
R33	82Ω	
R34	3900Ω 5W	
R35	15Ω 1W	
R36	15Ω 1W	
R37	15Ω 1W	
R38	75Ω 10W	
R39	150Ω 5W	
R40	50Ω 5W	

* Alternate

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	Bell Sound PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117 V @ .27A	580 VCT @ .020A	23.5V @ .165A	32B3						
	SEC. 3	SEC. 4	SEC. 5							
	6.3 VCT @ 1.2A									

ELECT. PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	Bell Sound PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	117V ⓐ .21A	33.5V ⓐ .510A		32B1						

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		Bell Sound PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Bias Osc.	31B10						Pri. Tap ⓐ 8.5Ω
L2	Equalizer Coil	31B32				6319		

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	Bell Sound PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.505A	B20107P10 ①		C1B1SDELX ①	4N33-1B1-RV ①		① Selenium Type
M2	.165A	42B2 ①	1016 ①	B1B ①	304B ①		

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			Bell Sound PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M3	MDL	2 8/10A 125V	53X3	B20001P13	31302.8 (2 8/10A 125V) S/B	342001	MDL 2 8/10	HKP

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		Bell Sound PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M4	1N60	42B3	1N60	1N60	1N60	Volume Indicator Rectifier (Pigtail)
M5	1N60	42B3	1N60	1N60	1N60	Volume Indicator Rectifier (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	Bell Sound PART No.	NOTES
M6	Erase Head	36B8	
M7	Record Head	36B7	
M8	Switch	43A8	Off-On (DPDT Slide Type)
M9	Switch	43A7	2T-4T (DPDT Slide Type)
M10	Switch	43C5	Pushbutton
M11	Switch	A25342	Rewind-Run
M12	Motor	35B4(or) 35C8	Take Up
M13	Motor	35B5(or) 35C9	Rewind
M14	Motor		Capstan

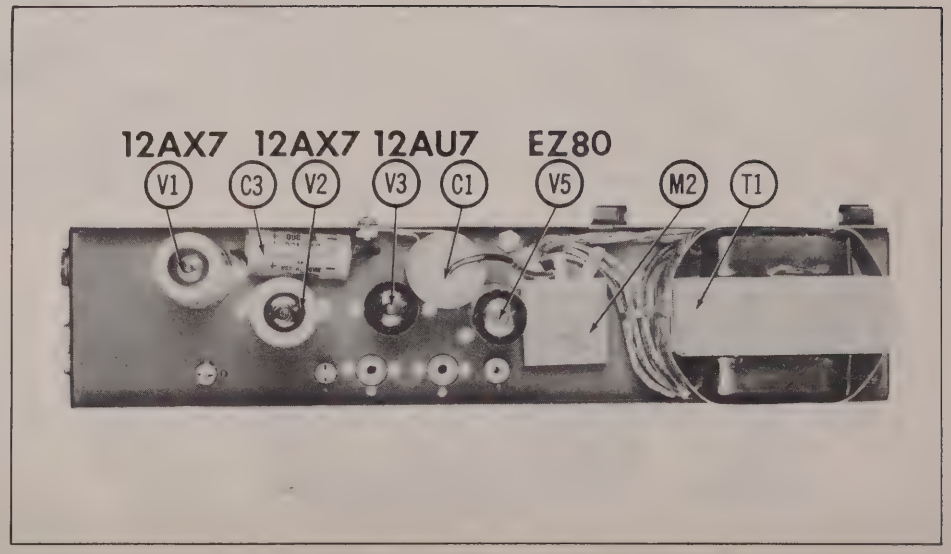
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	84A3	Outer (Volume)
Knob	84A4	Inner (Function Selector)

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No.	8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No.	1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No.	8401
Phono Pick-up Arm Cable	Use BELDEN No.	8430 (Two Conductor - Twisted)



AMP CHASSIS—TOP VIEW

PHOTOFACT* Folder with CIRCUITRACE*

CONTINENTAL MODEL TR-208

CONTINENTAL MODEL TR-208

CONTINENTAL MODEL TR-208

TRADE NAME	Continental Model TR-208
IMPORTER	Continental Merchandise Co., 236 Fifth Ave., New York 1, N. Y.
TYPE SET	Battery Operated Portable Transistorized AM Receiver
POWER SUPPLY	9 Volts DC
TUNING RANGE—BROADCAST	535KC — 1605KC
RATING	13MA @ 9 Volts DC (No Signal, Min. Volume) 14MA @ 9 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools: A3, A5.....GENERAL CEMENT # 9087, 9089
WALSCO # 2528

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.		Loop	455KC (400∿ Mod.)	Tuning gang fully open.	Across voice coil	A1, A2	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.		"	1605KC	"	"	A3	Adjust for maximum output.
3.		"	600KC	"	"	A4	"
4.		"	1400KC	"	"	A5	"

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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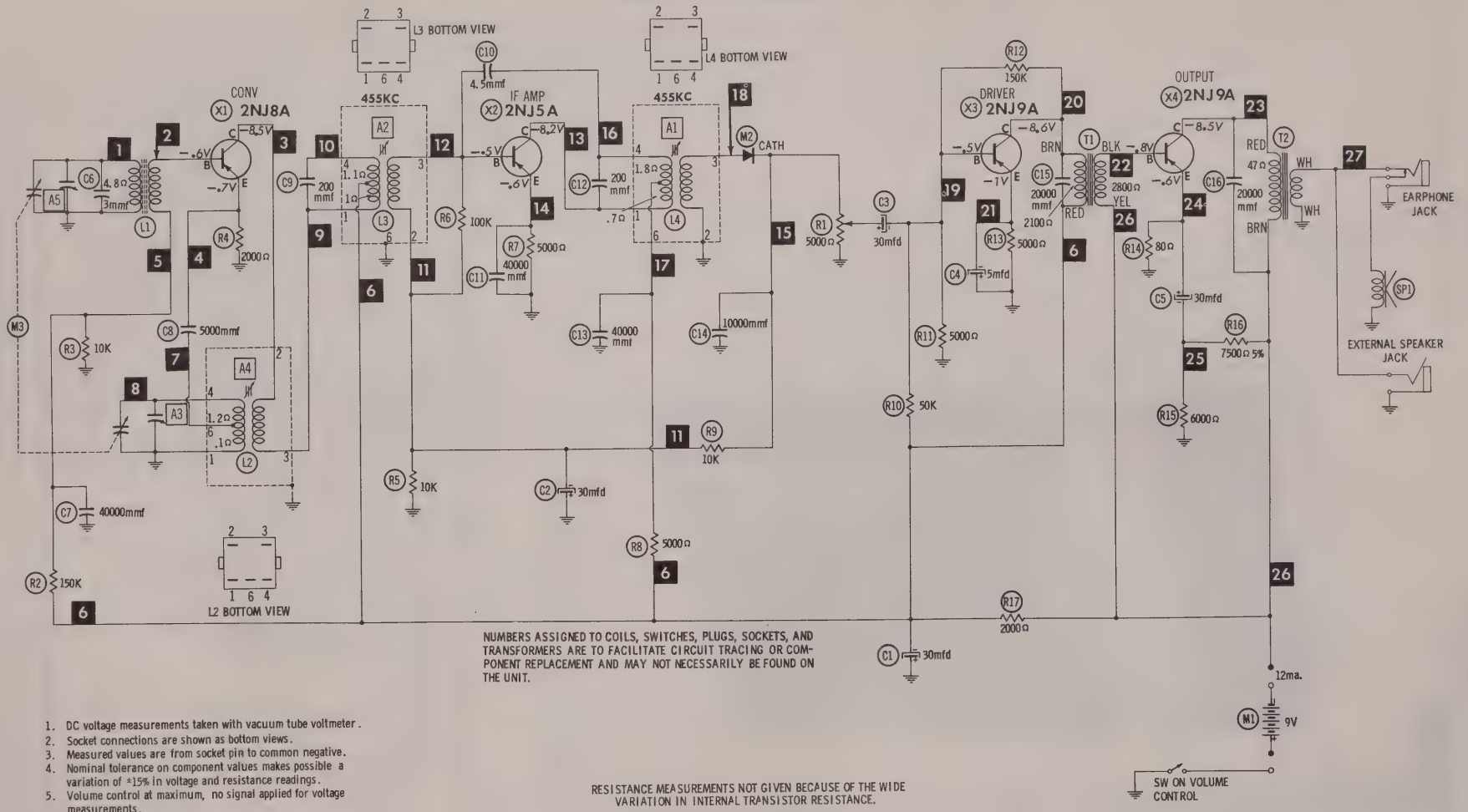
JF209



1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC
with CIRCUITRACE®

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CONTINENTAL
MODEL TR-208

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2NJ8A	Converter			2N486		PNP
X2	2NJ5A	IF Amplifier			2N484		PNP
X3	2NJ9A	Driver			2N362		PNP
X4	2NJ9A	Output			2N631		PNP

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	Continental PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	30	10		XPP-10030	NLW30-15	TT15X30	ML30-15	TE-1158	
C2	30	6		PWE6030	EC30-6	TT6X30	ML30-6	TE-1092	
C3	5	6		XPP-6005	EC5-6	TT6X5	ML5-6	TE-1084	
C4	30	6		PWE6030	EC30-6	TT6X30	ML30-6	TE-1092	
C5	30	6		PWE6030	EC30-6	TT6X30	ML30-6	TE-1092	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING			REPLACEMENT DATA						NOTES
	CAP.	VOLT	TOL	Continental PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C6	3				NPO-DI 3.0	D6-030	C10V3C		5TCCB-V3.0S*	
C7	40000				C-80V503AM	DA-503	H-05S5	TA-150	TG-S50	
C8	5000				C-80V502AM	DM-502	H-05D5	TA-250	TG-D50	
C9	200				BPD-0002	D6-201	L10T2		5GA-T2	
C10	4.5								5TCCB-V45S *	
C11	40000				C-80V503AM	DA-503	H-05S5	TA-150	TG-S5	
C12	200				BPD-0002	D6-201	L10T2		5GA-T2	
C13	4000				C-80V503AM	DA-503	H-05S5	TA-150	TG-S50	
C14	10000				C-80V103AM	DM-103	H-05S1	TA-110	TG-S10	
C15	20000				C-80V203AM	DA-203	H-05S2	TA-120	TG-S20	
C16	20000				C-80V203AM	DA-203	H-05S2	TA-120	TG-S20	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Continental PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	5000Ω	1/4	33.07T	B16-214				Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		Continental PART No.	NOTES
	OHMS	WATT		
R2	150K			
R3	10K			
R4	2000Ω			
R5	10K			
R6	100K			
R7	5000Ω			
R8	5000Ω			
R9	10K			

ITEM No.	RATING		Continental PART No.	NOTES
	OHMS	WATT		
R10	50K			
R11	5000Ω			
R12	150K			
R13	5000Ω			
R14	80Ω			
R15	6000Ω			
R16	7500Ω 5%			
R17	2000Ω			

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		Continental PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick							
L2	Osc. Coil							
L3	Input IF							
L4	Output IF							

PRINTED BOARD

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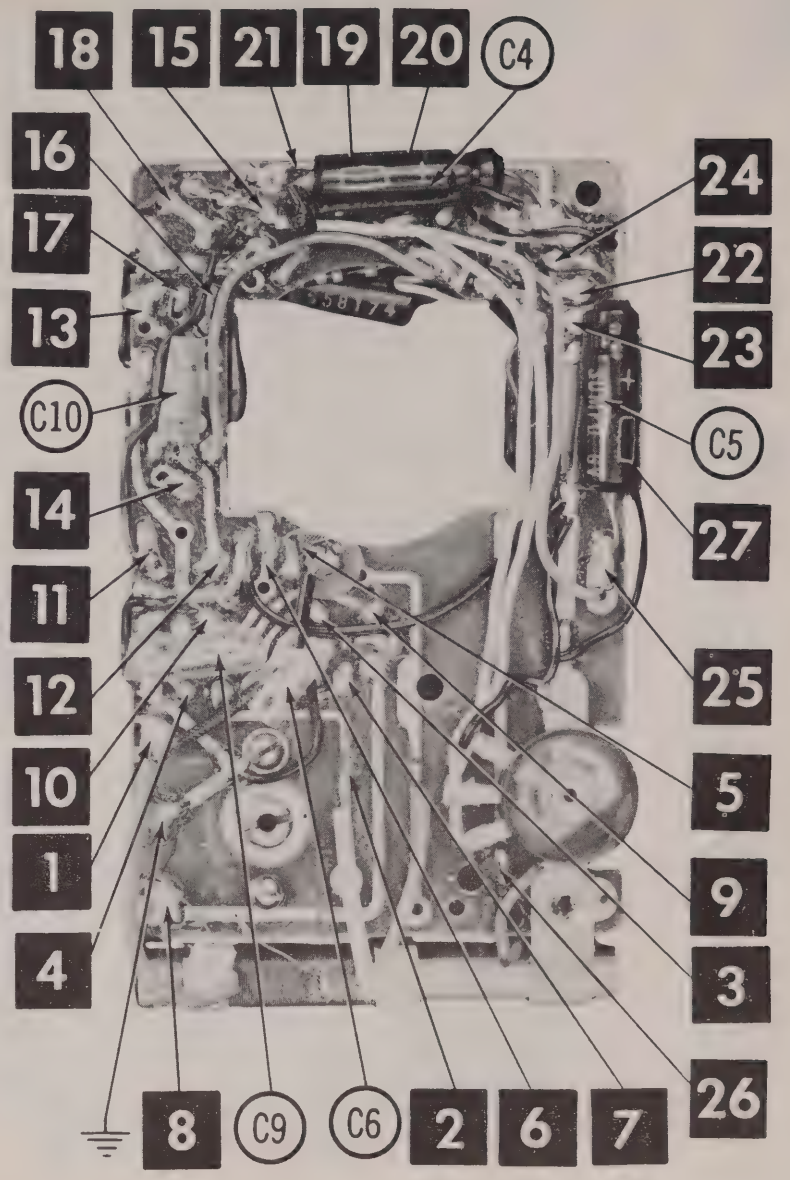


CONTINENTAL MODEL TR-208

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Continental PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	1	1	T-466						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	Continental PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	675Ω	12-14Ω	T-467							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Continental PART No.	QUAM PART No.	
SP1	2 1/4"	PM	12-14Ω	PM-223B	22A06Z13	

BATTERIES

ITEM No.	VOLTAGE	Continental PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	9V	BL-006P		2U6		216		M-1604 TR-146R①	① Mercury Type

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		Continental PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M2			1N60	1N60	1N60	Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	Continental PART No.	NOTES
M3	Tuning Cap.		2 Gang

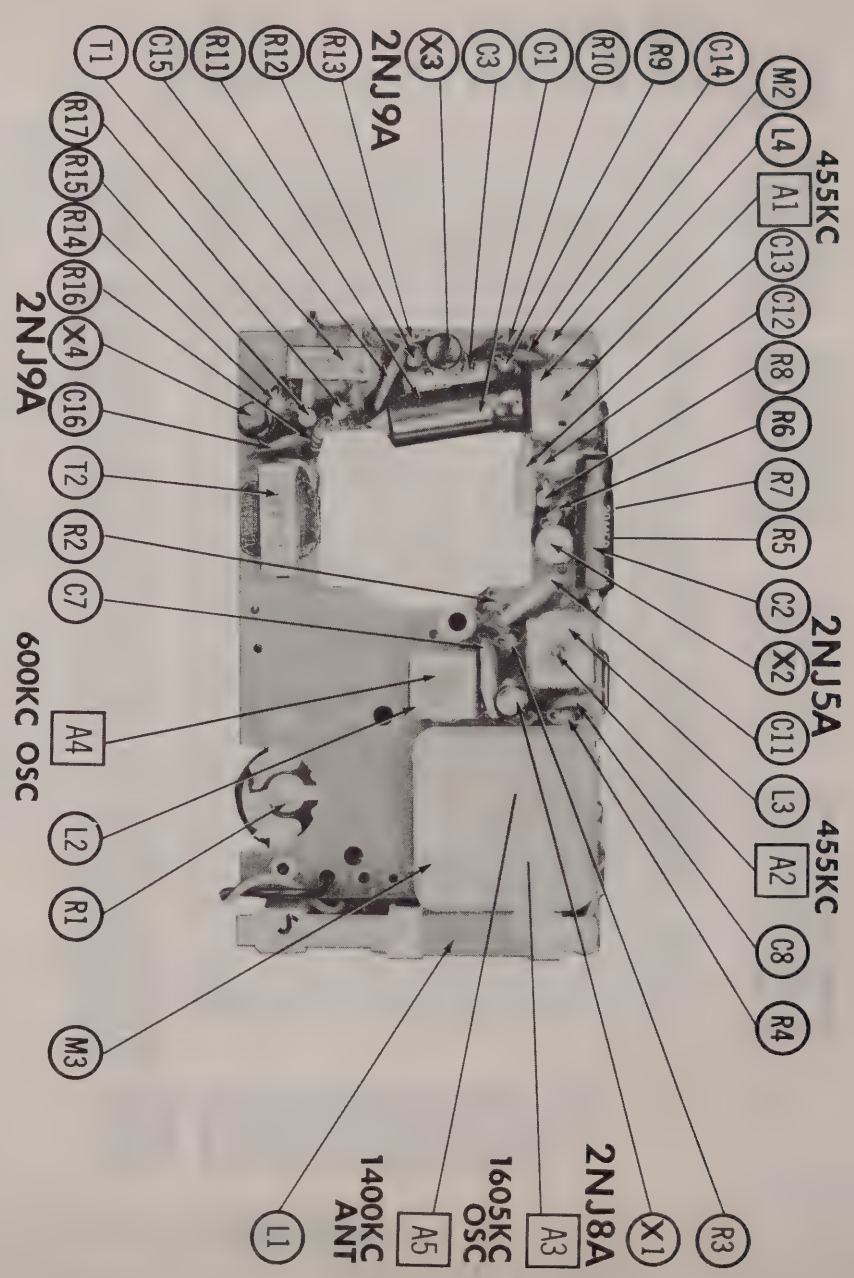
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW

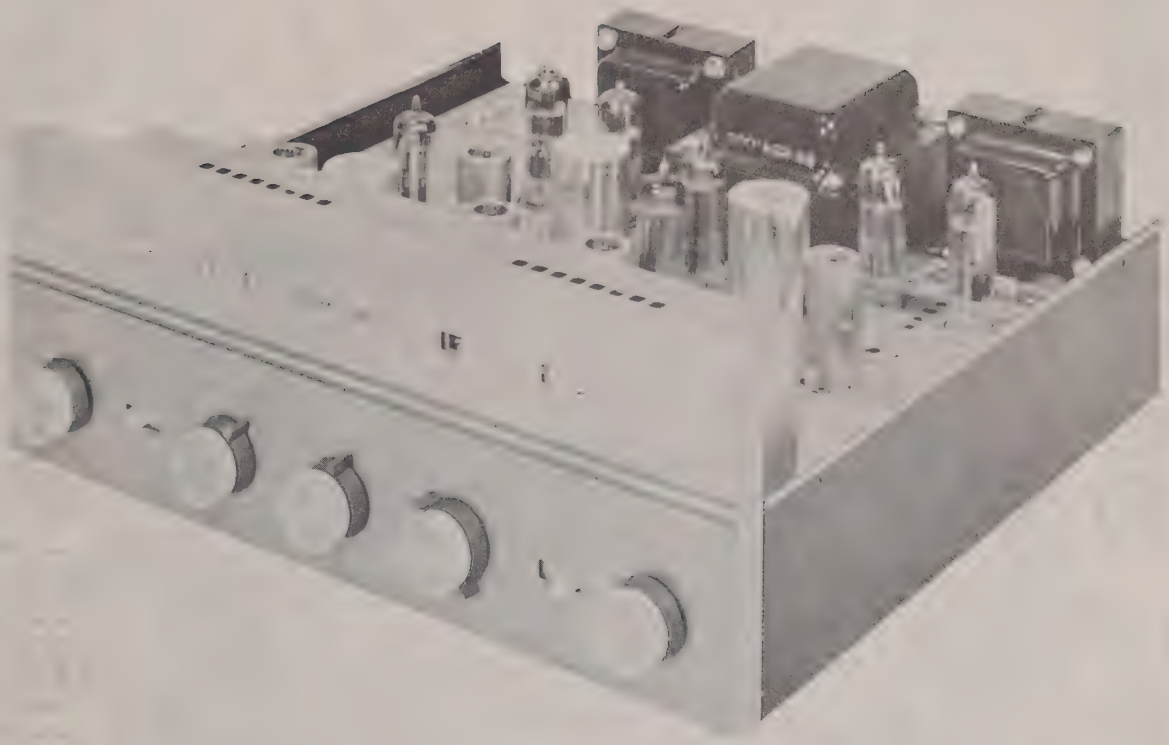


PHOTOFACT* Folder

EIA

BOGEN
MODEL DB-230

BOGEN
MODEL DB-230



BOGEN
MODEL DB-230

TRADE NAME	Bogen Model DB-230
MANUFACTURER	Bogen-Presto Co., A Div. of The Siegler Corp., P:O. Box 500, Paramus, N.J.
TYPE SET	AC Operated 15 Tube Stereo Amplifier
POWER SUPPLY	110-120 Volts AC, 60 Cycles RATING 115 Watts, 1.1 Amp. @ 117 Volts AC

BALANCE AND BIAS ADJUSTMENT

If an output tube (V5, V6, V11, V12) is replaced, the Balance and Bias Controls for that channel should be readjusted. (R4 & R5 for channel 1, R6 & R7 for channel 2).

1. Turn Bal. Adj. and Bias Adj. fully clockwise.
2. Remove shorting links from Bal. Mon. terminal strip.
3. Connect a DC voltmeter from terminal 1 to terminal 2 (negative).
4. Apply power and allow amplifier to warm up for 5 minutes.
5. Adjust Bias Adj. for 1.5V meter reading.
6. Move meter lead from terminal 2 to terminal 3. Adjust Bal. Adj. for 0V meter reading.
7. Move meter lead from terminal 3 to terminal 2 and readjust Bias Adj. for 1.5V meter reading.
8. Repeat steps 6 and 7 until meter indicates 1.5V between terminals 1 and 2, and 0V between terminal 1 and 3.
9. Replace shorting links (1 & 2, 2 & 3).
10. Repeat for other channel if necessary.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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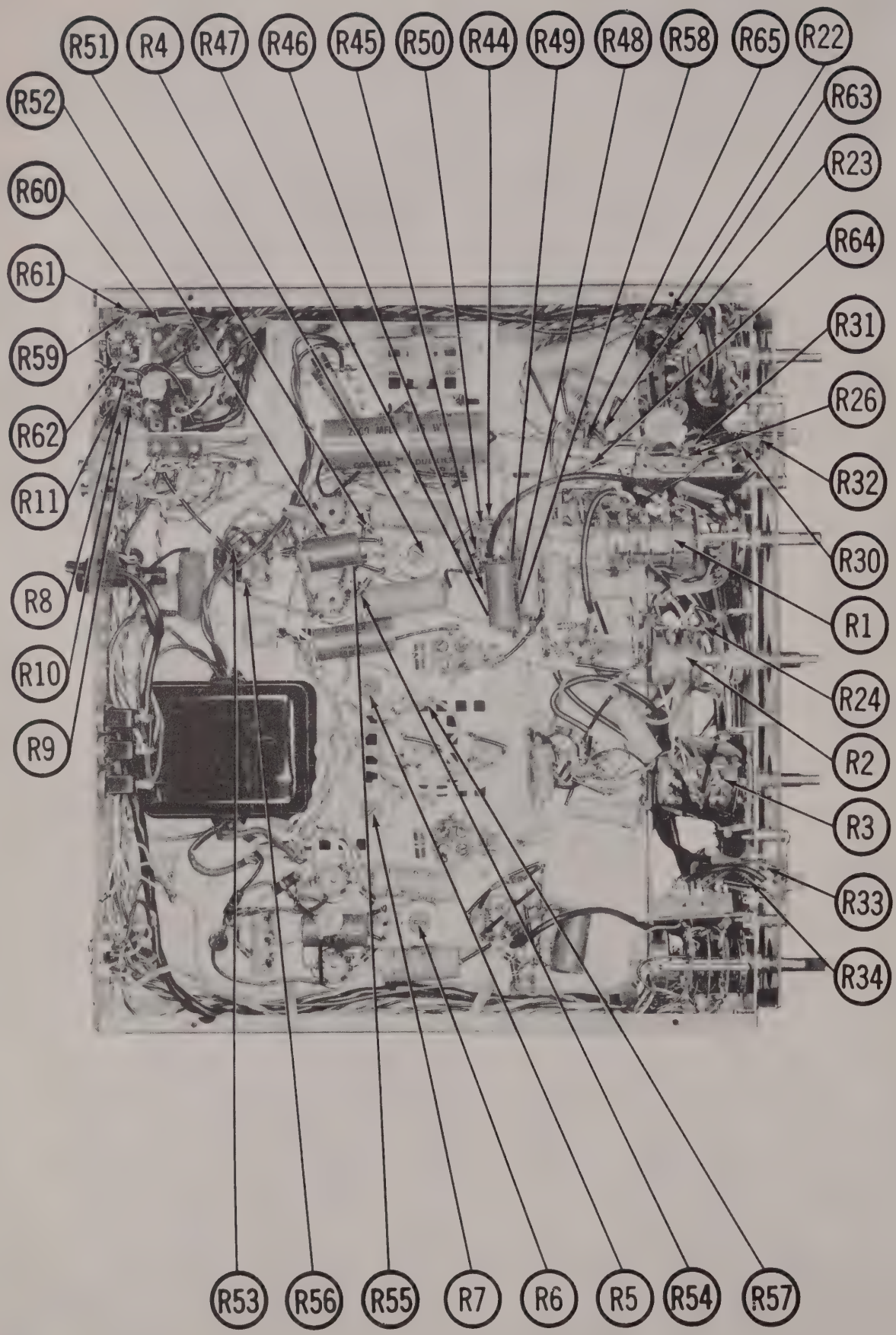
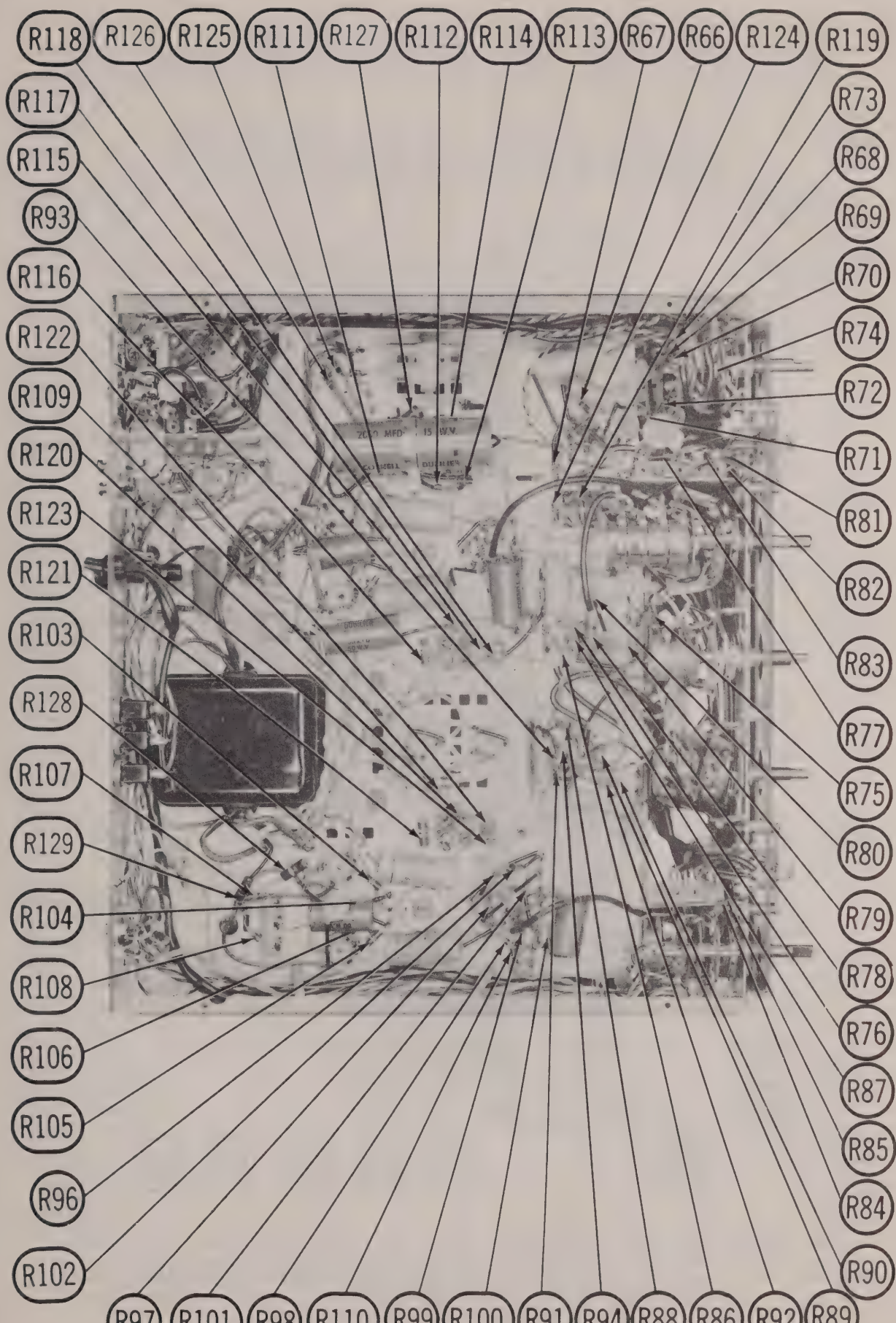
JV311

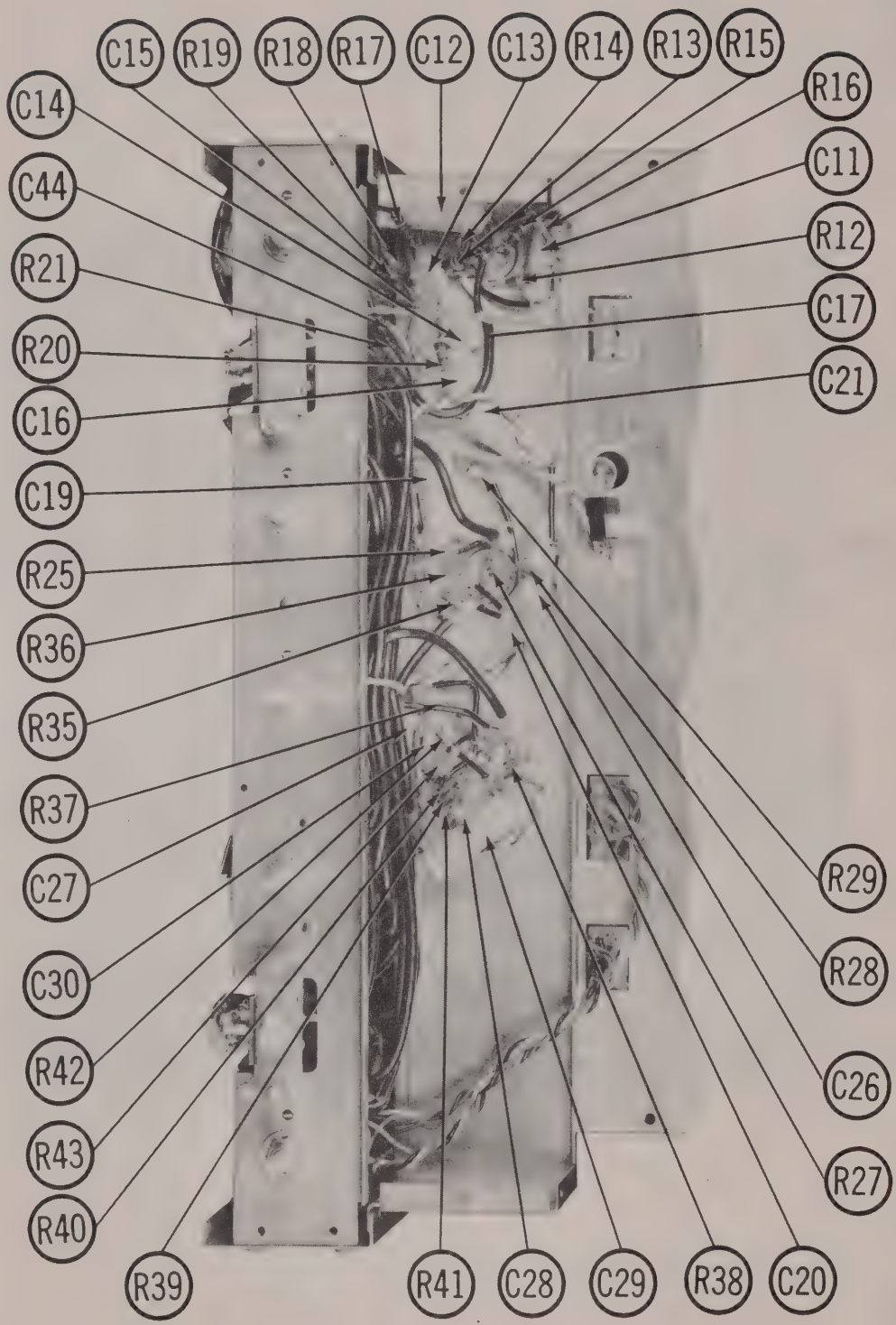
SET 461 FOLDER 5



CHASSIS BOTTOM VIEW - RESISTOR IDENT. (R1-R65)

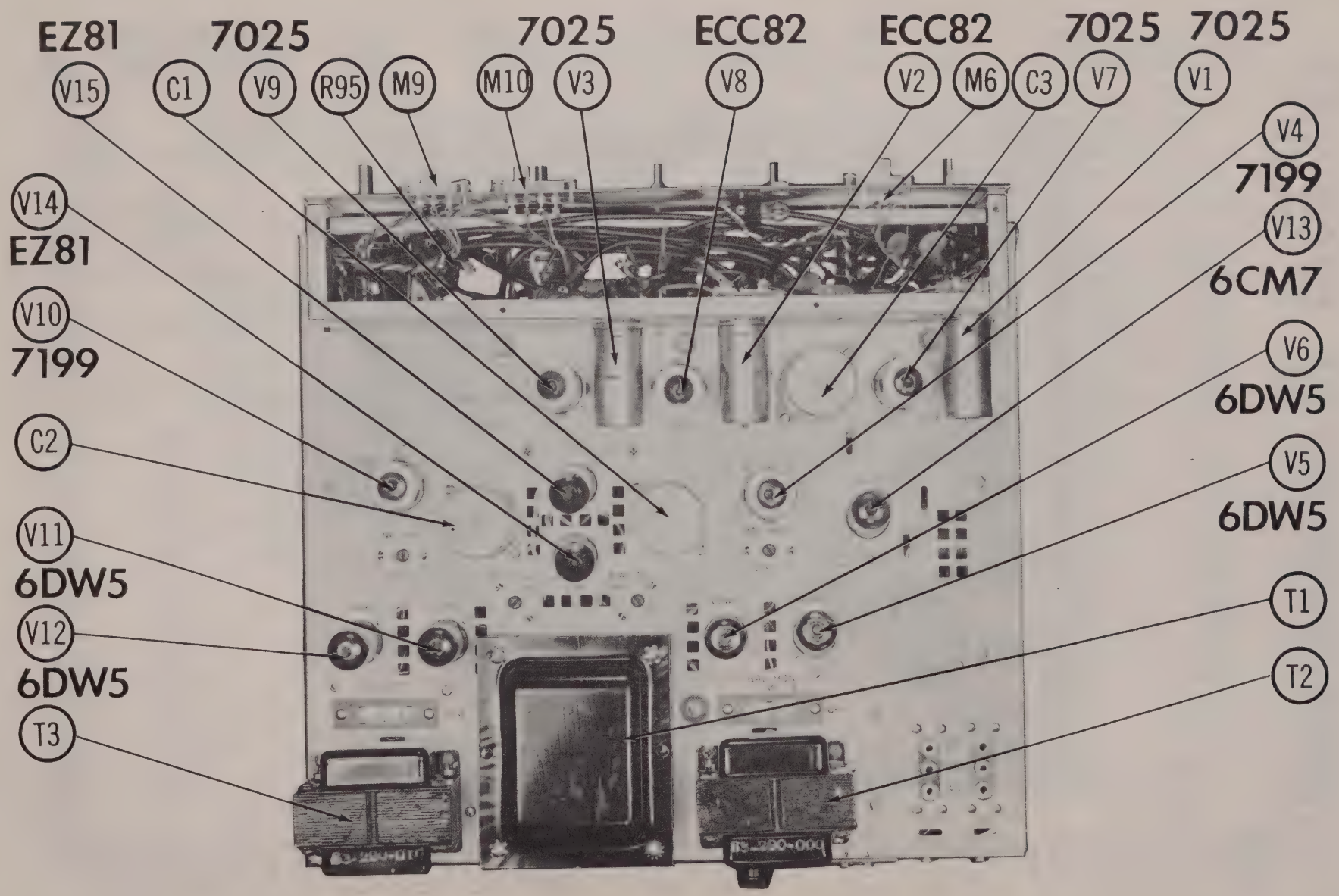


CHASSIS BOTTOM VIEW - RESISTOR IDENT. (R66-R129)

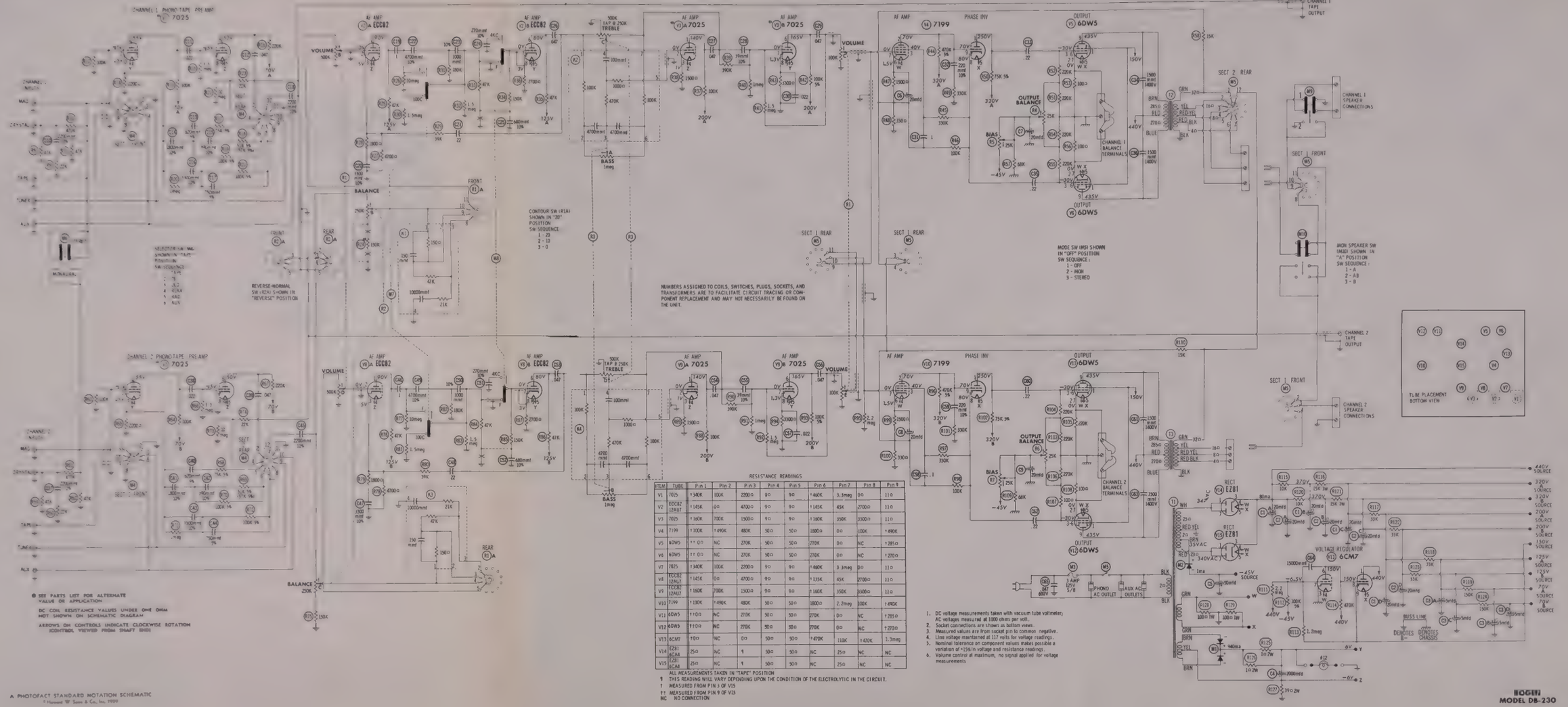


SUBCHASSIS - CHANNEL 1 AMPLIFIER

CHASSIS BOTTOM VIEW - CAPACITOR & MISC. IDENT.



CHASSIS - TOP VIEW



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	7025	†340K	100K	2200Ω	0Ω	0Ω	†460K	3.3meg	0Ω	11Ω
V2	ECC82 12AU7	†145K	0Ω	4700Ω	0Ω	0Ω	†145K	45K	2700Ω	11Ω
V3	7025	†160K	700K	1500Ω	0Ω	0Ω	†160K	350K	3300Ω	11Ω
V4	7199	†100K	†490K	480K	50Ω	50Ω	1800Ω	0Ω	100K	†490K
V5	6DW5	†† 0Ω	NC	270K	50Ω	50Ω	270K	0Ω	NC	†285Ω
V6	6DW5	†† 0Ω	NC	270K	50Ω	50Ω	270K	0Ω	NC	†270Ω
V7	7025	†340K	100K	2200Ω	0Ω	0Ω	†460K	3.3meg	0Ω	11Ω
V8	ECC82 12AU7	†145K	0Ω	4700Ω	0Ω	0Ω	†135K	45K	2700Ω	11Ω
V9	ECC82 12AU7	†160K	700K	1500Ω	0Ω	0Ω	†160K	350K	3300Ω	11Ω
V10	7199	†100K	†490K	480K	50Ω	50Ω	1800Ω	2.2meg	100K	†490K
V11	6DW5	†† 0Ω	NC	270K	50Ω	50Ω	270K	0Ω	NC	†285Ω
V12	6DW5	†† 0Ω	NC	270K	50Ω	50Ω	270K	0Ω	NC	†270Ω
V13	6CM7	†0Ω	NC	0Ω	50Ω	50Ω	†470K	110K	†470K	3.3meg
V14	EZ81 6CA4	250	NC	¶	50Ω	50Ω	NC	250	NC	NC
V15	EZ81 6CA4	250	NC	¶	50Ω	50Ω	NC	250	NC	NC

ALL MEASUREMENTS TAKEN IN "TAPE" POSITION
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 3 OF V13
†† MEASURED FROM PIN 9 OF V13
NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

® Howard W. Sams & Co., Inc. 1959

EICO
MODEL DB-230

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE
V1	Channel 1 Phono-Tape Preamp.	7025 (12AX7) *
V2	Channel 1 AF Amp.	ECC82/12AU7
V3	Channel 1 AF Amp.	7025 (12AX7) *
V4	Channel 1 AF Amp. - Channel 1 Phase Inv.	7199
V5	Channel 1 Output	6DW5
V6	Channel 1 Output	6DW5
V7	Channel 2 Phono-Tape Preamp.	7025 (12AX7) *
V8	Channel 2 AF Amp.	ECC82/12AU7
V9	Channel 2 AF Amp.	7025 12AX7) *
V10	Channel 2 AF Amp. - Channel 2 Phase Inv.	7199
V11	Channel 2 Output	6DW5
V12	Channel 2 Output	6DW5
V13	Voltage Regulator	6CM7
V14	Rectifier	EZ81/6CA4
V15	Rectifier	EZ81/6CA4

* Alternate

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA David Bogen PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲20	500	C554	AFH4-19-20	D0179.5	FP475	TMQ12	TVL-4834	
B	■20	400					TD-20-500		
C	▲20	350							
D	20	300							
C2A	▲20	500	C554	AFH4-19-20	D0179.5	FP475	TMQ-12	TVL-4834	
B	■20	400					TD-20-500		
C	▲20	350							
D	20	300							
C3A	▲5	450	C506	AFH4-09	D0080	WP433.6	TMQ-9	TVL-4759.7	
B	■5	450							
C	5	450							
D	▲5	450							
C4	2000	15	C537	PRS15V2000	BR20001	TC1501	TD-1000-15	TVA-1163	
						TC1501	TD-1000-15	TVA-1163	
C5	50	50		PRS50V50	BR505	TC39	TD-50-50	TVA-1308	
C6	20	50	C224	PRS50V20	BBR25-50	TT50X20	TD-20-150	TVA-1410	
C7	20	50	C224	PRS50V20	BBR25-50	TT50X20	TD-20-150	TVA-1410	
C8	20	50	C224	PRS50V20	BBR25-50	TT50X20	TD-20-150	TVA-1410	
C9	20	50	C224	PRS50V20	BBR25-50	TT50X20	TD-20-150	TVA-1410	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	RATING TOL	REPLACEMENT DATA David Bogen PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C10	2200		10%		DI-2200		PM6D22	JL-222	6TM-D22	
C11	.022	200			P288N-022		CUB4S22	GEM-4122	4TM-S22	
C12	.047	400			P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C13	620		5%				1R5T62		MS-362	
C14	1800		10%		DI-1800		1R5D18	JL-218	MS-218	
C15	390		10%		DI-390	MD-391	L10T39	MCB243	MS-339	
C16	3300		10%		DI-3300		PM6D33	JL-233	6TM-D33	
C17	750		5%						MS-375	
C18	2200		10%		DI-2200		PM6D22	JL-222	6TM-D22	
C19	.1	400			P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	
C20	3300		10%		DI-3300		PM6D33	JL-233	6TM-D33	
C21	.22	200			P288N-22		CUB2P22	GEM-2022	2TM-P22	
C22	4700		10%		DI-4700		PM6D47	JL-247	6TM-D47	
C23	1000		10%		DI-1000		PM6D1	JL-210	6TM-D1	
C24	270		10%		DI-270	MD-271	L10T27		MS-327	
C25	680		10%		DI-680	MD-681	1R5T68	JL-368	MS-368	
C26	.047	400			P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C27	.047	400			P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C28	39		10%		DI-39	DD-390	L10Q39	CNO-439	MS-439	

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	RATING TOL	REPLACEMENT DATA David Bogen PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C29	.047	400			P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C30	.022	200			P288N-022		CUB4S22	GEM-4122	4TM-S22	
C31	.1	200			P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C32	220		10%		DI-220	MD-220	L10T22	JL-322	MS-322	
C33	.22	400			P488N-22		CUB4P22	GEM-4022	4TM-P22	
C34	1500	1400			HVD-15-1500	DD30-152	HVC16D15	2HV-215	20GA-D15S *	
C35	.22	400			P488N-22		CUB4P22	GEM-4022	4TM-P22	
C36	1500	1400			HVD-15-1500	DD30-152	HVC16D15	2HV-215	20GA-D15S *	
C37	2200		10%		DI-2200		PM6D22	JL-322	6TM-D22	
C38	.022	200			P288N-022		CUB4S22	GEM-4122	4TM-4S22	
C39	.047	400			P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C40	620		5%				1R5T62		MS-368	
C41	1800		10%		DI-1800		1R5D18	JL-218	MS-218	
C42	390		10%		DI-390	MD-390	L10T39	MCB243	MS-339	
C43	3300		10%		DI-3300		PM6D33	JL-233	6TM-D33	
C44	750		5%						MS-375	
C45	2200		10%		DI-2200		PM6D22	JL-222	6TM-D22	
C46	.1	400			P488N-1	DF-503	CUB4P1	GEM-401	4TM-P1	
C47	3300		10%		DI-3300		PM6D33	JL-233	6TM-D15	
C48	.22	200			P288N-22		CUB2P22	GEM-2022	2TM-P22	
C49	4700		10%		DI-4700		PM6D47	JL-247	6TM-D15	
C50	1000		10%		DI-1000		PM6D1	JL-210	6TM-D1	
C51	270		10%		DI-270	MD-270	L10T27		MS-327	
C52	680		10%		DI-680	MD-681	1R5T68	JL-368	MS-368	
C53	.047	400			P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C54	.047	400			P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C55	39		10%		DI-39	DD-390	L10Q39	CNO-439	MS-439	
C56	.047	400			P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C57	.022	200			P288N-022		CUB4S22	GEM-4122	4TM-S22	
C58	.1	200			P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C59	220		10%		DI-220	MD-220	L10T22	JL-322	MS-322	
C60	.22	400			P488N-22		CUB4P22	GEM-4022	4TM-P22	
C61	1500	1400			HVD-15-1500	HVD30-1500	HVE16D15	2HV-215	20GA-D15S *	
C62	.22	400			P488N-22		CUB4P22	GEM-4022	4TM-P22	
C63	1500	1400			HVD-15-1500	HVD30-1500	HVE16D15	2HV-215	20GA-D15S *	
C64	15000					DD16-153	BYA10S15		5GA-S15S *	
C65	.047	600			P688N-047	DF-503	CUB6S47	GEM-6147	6TM-S47	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA David Bogen PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	Switch		81-001-472					Contour
B	500K	1/2						Volume, Channel 1
C	100K	1/2						Volume, Channel 1
D	500K	1/2						Volume, Channel 2
E	100K	1/2						Volume, Channel 2
R2A	Switch		81-001-485					Normal-Reverse-Stereo
B	250K	1/2						Balance, Channel 1
C	250K	1/2						Balance, Channel 2
R3A	1meg	1/2	77-001-452					Bass, Channel 1
B	1meg	1/2						Bass, Channel 2
C	500K	1/2						Treble, Channel 1, Tap @ 250K
D	500K	1/2						Treble, Channel 2, Tap @ 250K
R4A	25K	1/2	77-001-410	AB-26	B47-25K-S	B11-120	TA253L	Bal. Adj. Channel 1
B	Shaft			AK-1	Not Req.	TMI	Not Req.	
R5A	25K	1/2	77-001-410	AB-26	B47-25K-S	B11-120	TA253L	Bias Adj. Channel 1
B	Shaft			AK-1	Not Req.	TMI	Not Req.	
R6A	25K	1/2	77-001-410	AB-26	B47-25K-S	B11-120	TA253L	Bal. Adj. Channel 2
B	Shaft			AK-1	Not Req.	TMI	Not Req.	
R7A	25K	1/2	77-001-410	AB-26	B47-25K-S	B11-120	TA253L	Bias Adj. Channel 2
B	Shaft			AK-1	Not Req.	TMI	Not Req.	

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R8	47K	
R9	22K	
R10	470K	
R11	47K	
R12	100K	
R13	100K	
R14	2200Ω	
R15	3.3meg	
R16	220K	
R17	75K 5%	
R18	51K 5%	(57K) *
R19	100K 5%	
R20	1meg	
R21	100K 5%	
R22	10meg	
R23	22K	
R24	150K	Note 1
R25	47K	
R26	10meg	
R27	4700Ω	
R28	1800Ω	
R29	39K	
R30	1.5meg	
R31	180K	
R32	1.5meg	
R33	47K	
R34	150K	
R35	47K	
R36	2700Ω	
R37	100K	
R38	1500Ω	
R39	390K	
R40	1meg	
R41	1.5meg	
R42	100K 5%	
R43	3300Ω	
R44	470K 5%	
R45	330K	
R46	100K	
R47	1500Ω	
R48	330Ω	
R49	330K	
R50	75K 5%	
R51	220K	
R52	220K	
R53	100Ω	
R54	220K	
R55	220K	
R56	100Ω	
R57	68K	
R58	15K	
R59	47K	
R60	22K	
R61	470K	
R62	47K	
R63	100K	
R64	100K	
R65	2200Ω	
R66	3.3meg	
R67	220K	
R68	75K 5%	
R69	51K 5%	(57K) *
R70	100K 5%	
R71	1meg	
R72	100K 5%	
R73	10meg	
R74	22K	
R75	150K	
R76	47K	
R77	10meg	
R78	4700Ω	
R79	1800Ω	
R80	39K	
R81	1.5meg	
R82	180K	
R83	1.5meg	
R84	47K	
R85	150K	
R86	47K	
R87	2700Ω	
R88	100K	
R89	1500Ω	
R90	390K	
R91	1meg	
R92	1.5meg	
R93	100K	
R94	3300Ω	
R95	2.2meg	
R96	470K 5%	
R97	330K	
R98	100K	
R99	1500Ω	
R100	330Ω	
R101	330K	
R102	75K 5%	
R103	220K	
R104	220K	
R105	220K	
R106	220K	
R107	100Ω	
R108	100Ω	
R109	68K	
R110	15K	
R111	2.2meg	
R112	100K 5%	
R113	1.2meg	
R114	470K	
R115	10K	
R116	15K 1W	
R117	33K	
R118	33K	
R119	150K	
R120	10K	
R121	15K 1W	
R122	33K	
R123	33K	
R124	150K	
R125	1Ω 2W	
R126	1Ω 2W	
R127	39Ω 2W	
R128	100Ω 1W	
R129	100Ω 1W	

* Alternate
Note 1. Not used in some versions.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	David Bogen PART No.	REPLACEMENT DATA	
K1	Channel 1 Contour	150mmf, 10000mmf, 150Ω, 21K, 47K	78-906-001	Sprague	TC-8
K2	Channel 1 Tone Comp.	100mmf, 4700mmf, 4700mmf, 1000Ω, 100K, 100K, 470K		Centralab Sprague	PC-190 TC-1
K3	Channel 2 Contour	150mmf, 10000mmf, 150Ω, 21K, 47K	78-906-001	Sprague	TC-8
K4	Channel 2 Tone Comp.	100mmf, 4700mmf, 4700mmf, 1000Ω, 100K, 100K, 470K		Centralab Sprague	PC-190 TC-1

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	David Bogen PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V ⓐ 1.1A	680 VCT ⓐ .080A Tap ⓐ 35V ⓐ .003A	22 VCT ⓐ .9A	83-588-000						
	SEC. 3	SEC. 4	SEC. 5							
	6.3V ⓐ 7.9A									

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	David Bogen PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	6000Ω CT	32Ω Taps ⓐ 16Ω, 8Ω, 4Ω	83-290-010							
T3	6000Ω CT	32Ω Taps ⓐ 16Ω, 8Ω, 4Ω	83-290-010							

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	David Bogen PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.940A	H550 ①			5N26-1C1-RV ①		① Selenium Type
M2	.001A	H373 ①	1159 ①	D-5410 ①	10 ①		

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			David Bogen PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M3	3AG	3A 125V S/B			313003. (3A 125V S/B)	342001	MDX3	HKP

MISCELLANEOUS

ITEM No.	PART NAME	David Bogen PART No.	NOTES
M4	Switch	81-001-470	Selector (Tape-78-Old-RIAA-Radio-Aux.)
M5	Switch	81-001-478	Mode (Off-Monaural-Stereo)
M6	Switch	81-003-009	Phono Mix (Mon-Stereo)(DPDT, Slide Type)
M7	Switch	81-003-009	Lo Filter (DPDT, Slide Type)
M8	Switch	81-003-009	Hi Filter (DPDT, Slide Type)
M9	Switch		Phase, (DPDT, Slide Type)
M10	Switch	S515	Speaker (DPTT, Slide Type)

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

PHOTOFACT* Folder

FIRESTONE MODELS 4-A-156, 4-A-157, 4-A-158, (Code 1-8-51/184, /283, /284

FIRESTONE MODELS 4-A-156, 4-A-157, 4-A-158, (Code 1-8-51/184, /283, /284

MODEL 4-A-158

FIRESTONE MODELS 4-A-156, 4-A-157, 4-A-158, (Code 1-8-51/184, /283, /284

TRADE NAME	Firestone Models 4-A-156 (Code 1-8-51/184), 4-A-157 (Code 1-8-51/283), 4-A-158 (Code 1-8-51/284)
SUPPLIER	Firestone Tire & Rubber Co., 1200 Firestone Parkway, Akron 17, Ohio
TYPE SET	AC Operated 5 Tube AM Receiver (Models 4-A-157, 4-A-158 Are Clock Versions)
POWER SUPPLY	110-120 Volts AC, 60 Cycles
RATING	22 Watts, .25 Amp. @117 Volts AC (Less Clock)
TUNING RANGE—BROADCAST	535 — 1620KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1mfd capacitor in series with low side of signal generator. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools: A1 thru A4.....GENERAL CEMENT #5097, 8727
WALSCO #2515
A5, A6.....GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to pin 7 (grid) of converter. Low side to chassis.	455KC (400~ Mod.)	Tuning gang fully open.	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		Loop	1400KC	1400KC Signal	"	A6	"

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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JG358

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Converter	12BE6	V4	Output	50C5
V2	IF Amplifier	12BA6	V5	Rectifier	35W4
V3	Det.-AVC-AF Amp.	12AV6			

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	FIRESTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	50	150	582005	PRS150V50-30	BBRD5315	WD210	TDLD-8	TVA-2450	
B	30	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING			REPLACEMENT DATA						NOTES
	CAP.	VOLT	TOL	FIRESTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	.047	200			P288N-047	DF-503	CUB2S47	GEM-4147	2TM-S47	
C3	.02	400			P488N-02	DD-203	CUB4S2	GEM-412	4TM-S2	
C4	.047	400			P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C5	.1	400			P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	FIRESTONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1meg	½	368030	B-70	A47-1meg-Z	Q13-137	U53	Volume Note 1
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	

Note 1. Model 4-A-156 uses 1meg Control with switch (Part #368029).

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	22K	
R3	150Ω	(180Ω) *

* Alternate

ITEM No.	RATING	REMARKS
R4	2.2meg	
R5	150Ω 1W	

ITEM No.	RATING	REMARKS
R6	2200Ω 1W	

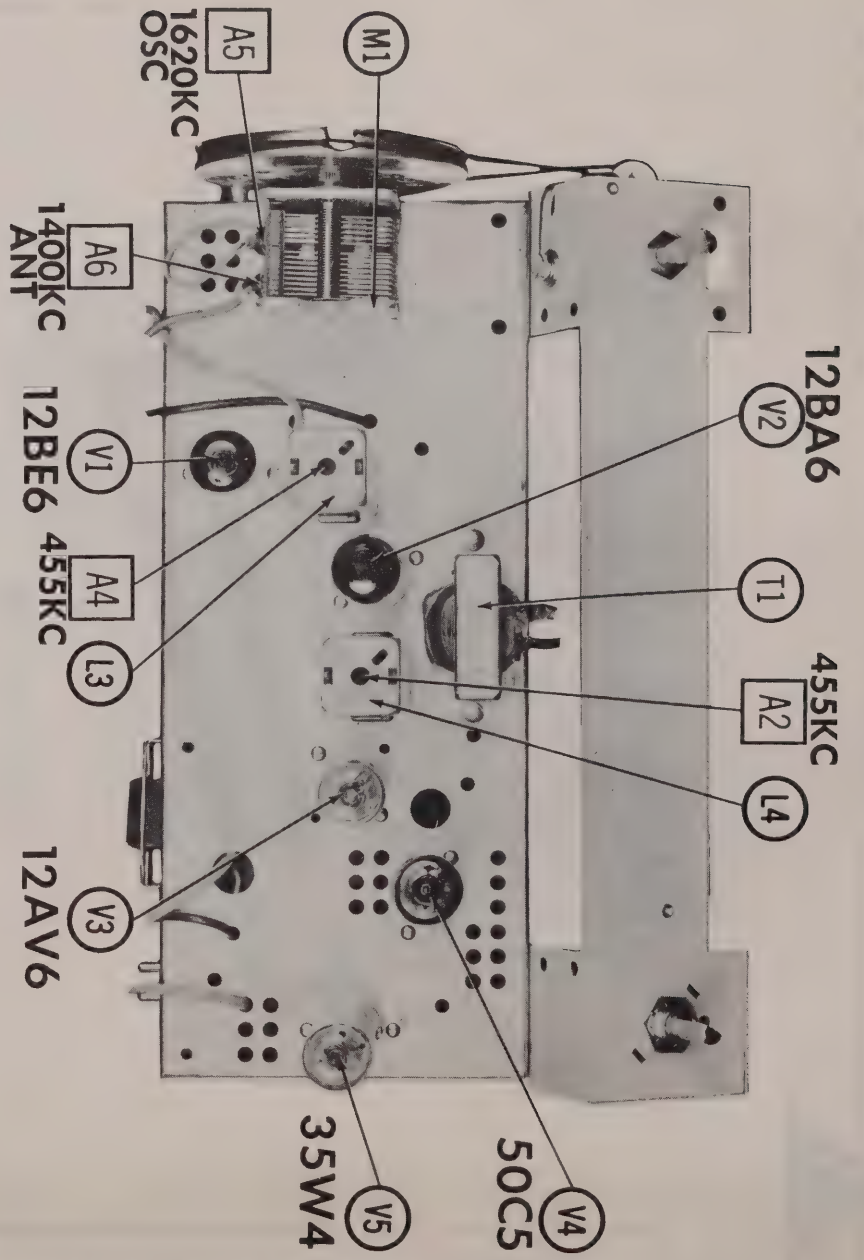
COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	FIRESTONE PART No.	REPLACEMENT DATA	
K1	Audio Coupling	220mmf, 500mmf, 5000mmf, 5000mmf, 470K, 470K, 6.8meg	420006	Aerovox Centralab Cornell-Dubilier Sprague	PA-113-2 PC151 116TM2 DT-2

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		FIRESTONE PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick	464028						
L2	Osc. Coil	455075			BC-393			
L3	Input IF	450023	16-6758	16-6758	BC-352	12-C9	RF-1	
L4	Output IF	450023	16-6758	16-6758	BC-353	12-C10	RF-2	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	FIRESTONE PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2200Ω	3-4Ω	430330	24S53	A-3025	AU-605	A-3332	24S53	S-12X	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	FIRESTONE PART No.	QUAM PART No.	
SP1	4"	PM	3-4Ω	404003	4A07	① Alternate
	4"	PM	3-4Ω	404006①	4A07	

MISCELLANEOUS

ITEM No.	PART NAME	FIRESTONE PART No.	NOTES
M1	Tuning Cap	590054	2 Gang Ant. 11—210mmf, Osc. 14—115mmf, Models 4-A-158, 4-A-156
	Tuning Cap	590052	2 Gang Model 4-A-157
M2	Clock	384020	Model 4-A-158
	Clock	384019	Model 4-A-157

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

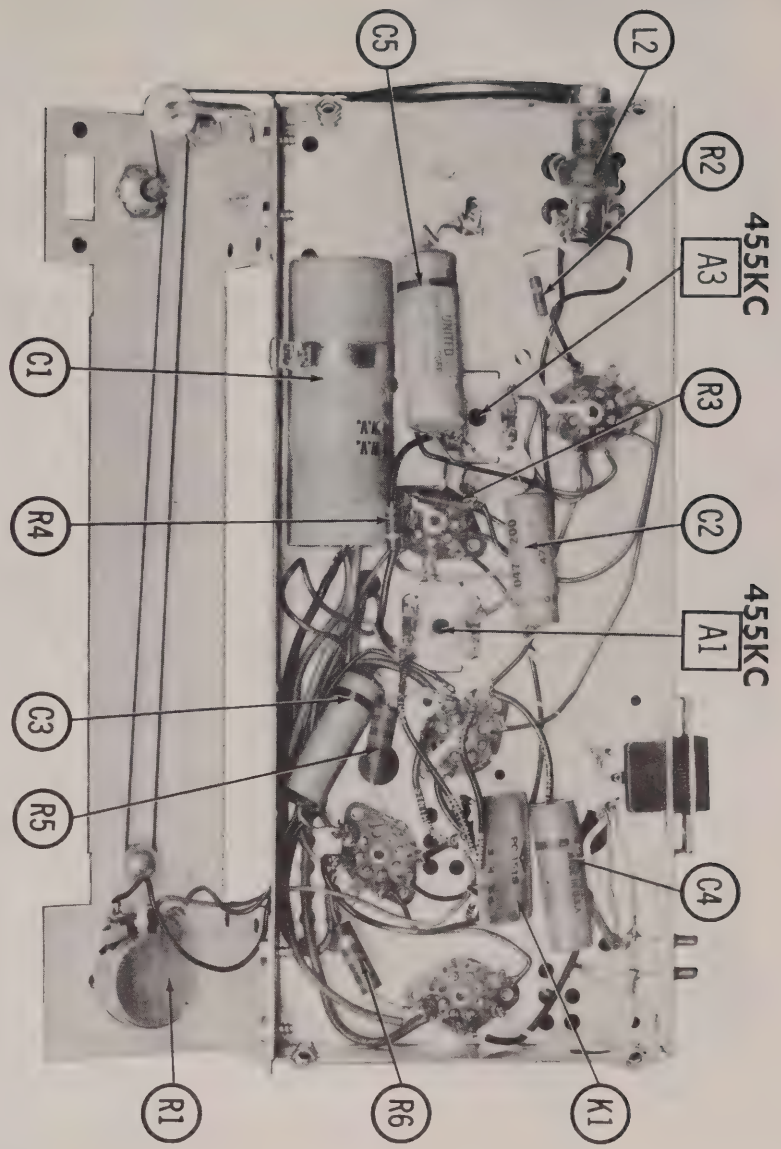
NAME	PART NO.	DESCRIPTION
Knob	272261	Gold Model 4-A-158, 4-A-156
Knob	272260	Blue Model 4-A-158
Knob	272250	Pink Model 4-A-156
Knob	272262	Tuning, Red Model 4-A-157
Knob	272251	Tuning, Pink Model 4-A-157
Knob	272259	Volume, Red Model 4-A-157
Knob	272250	Volume, Pink Model 4-A-157
Knob	272252	Clock, Model 4-A-158
Knob	272224	Clock, Model 4-A-157
Cabinet Front	250370	White Model 4-A-158
Cabinet Rear	250313	Gold Model 4-A-158
Cabinet Rear	250312	Blue Model 4-A-158
Cabinet Front	250340	White Model 4-A-156
Cabinet Rear	250213	Gold Model 4-A-156
Cabinet Rear	250214	Pink Model 4-A-156
Cabinet Front	250360	White Model 4-A-157
Cabinet Rear	250301	Red Model 4-A-157
Cabinet Rear	250304	Pink Model 4-A-157

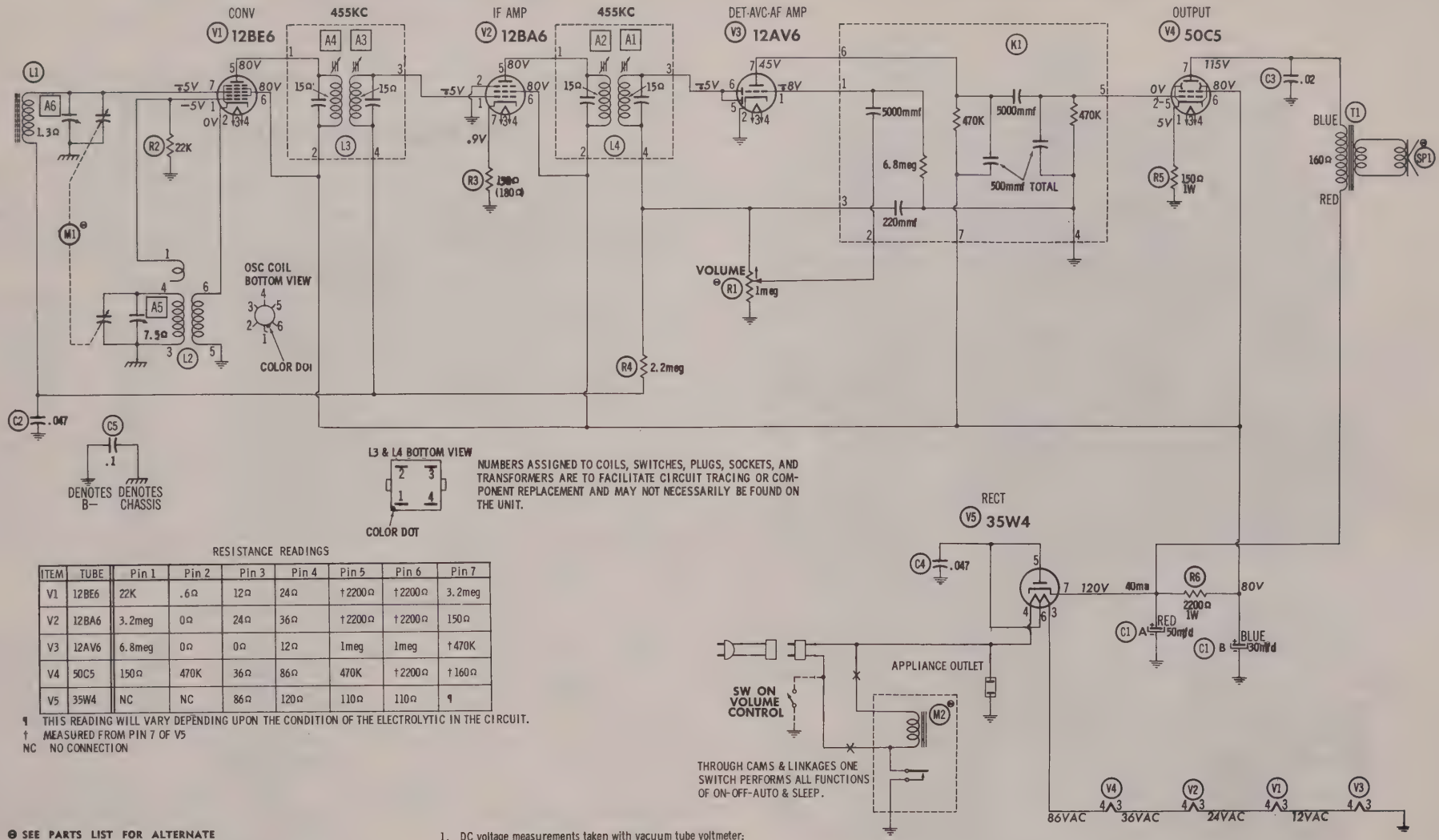
WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)

DRIVE CORD STRINGING

CHASSIS BOTTOM VIEW





NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12BE6	22K	.6Ω	12Ω	24Ω	†2200Ω	†2200Ω	3.2meg
V2	12BA6	3.2meg	0Ω	24Ω	36Ω	†2200Ω	†2200Ω	150Ω
V3	12AV6	6.8meg	0Ω	0Ω	12Ω	1meg	1meg	†470K
V4	50C5	150Ω	470K	36Ω	86Ω	470K	†2200Ω	†160Ω
V5	35W4	NC	NC	86Ω	120Ω	110Ω	110Ω	¶

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 7 OF V5
NC NO CONNECTION

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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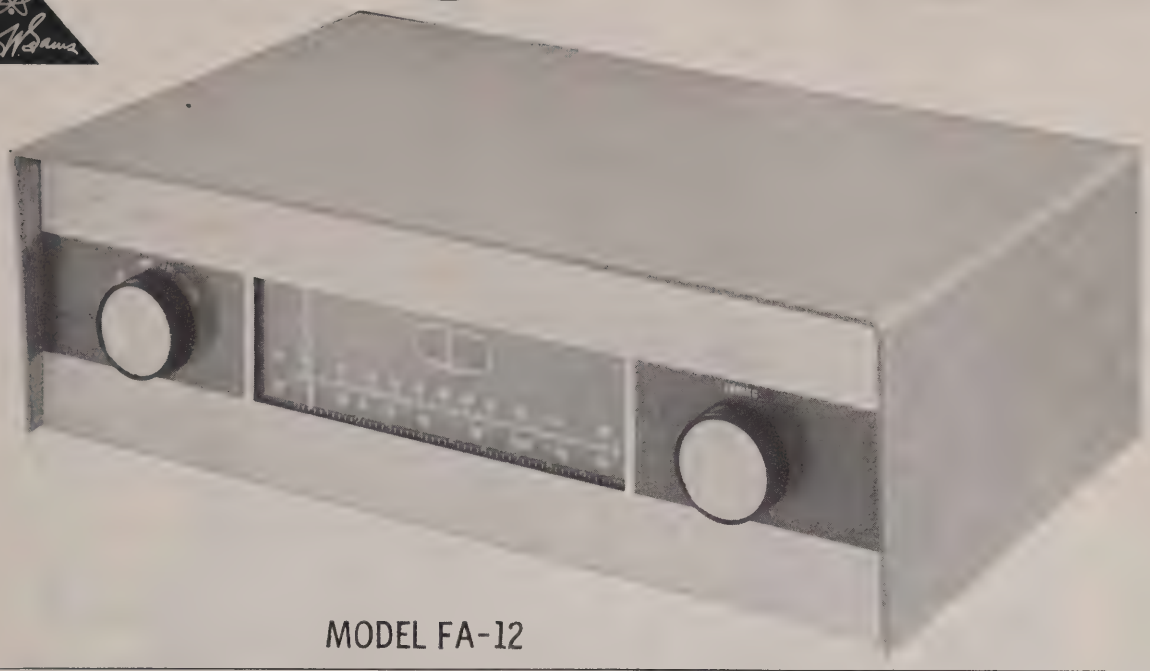
FIRESTONE MODELS 4-A-156, 4-A-157, 4-A-158, (Code 1-8-51/184, /283, /284

PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

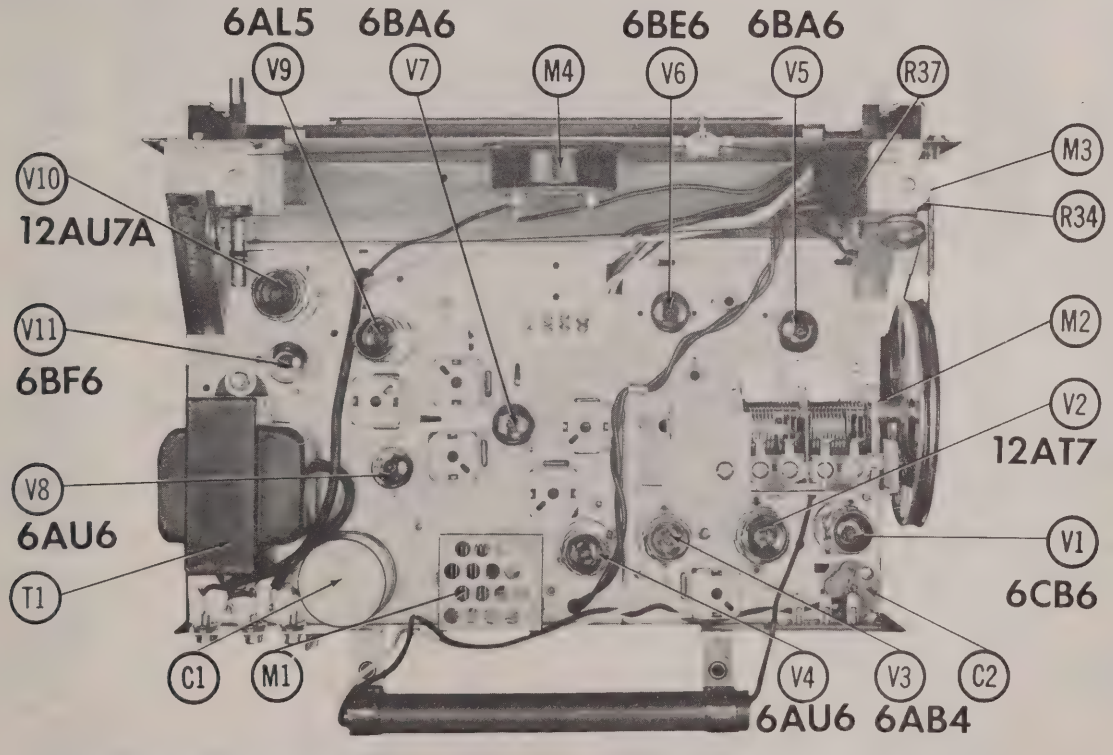
GENERAL ELECTRIC MODELS FA-10, FA-11, FA-12

GENERAL ELECTRIC MODELS
FA-10, FA-11, FA-12



MODEL FA-12

TRADE NAME	General Electric Models FA-10, FA-11, FA-12		
MANUFACTURER	General Electric Co., Specialty Electronic Components Dept., W. Genesee St., Auburn, N. Y.		
TYPE SET	AC Operated 11 Tube FM-AM Tuner		
POWER SUPPLY	105-125 Volts AC, 50-60 Cycles	RATING	36 Watts, .375 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535 — 1620KC	FREQ. MOD.	88 — 108MC

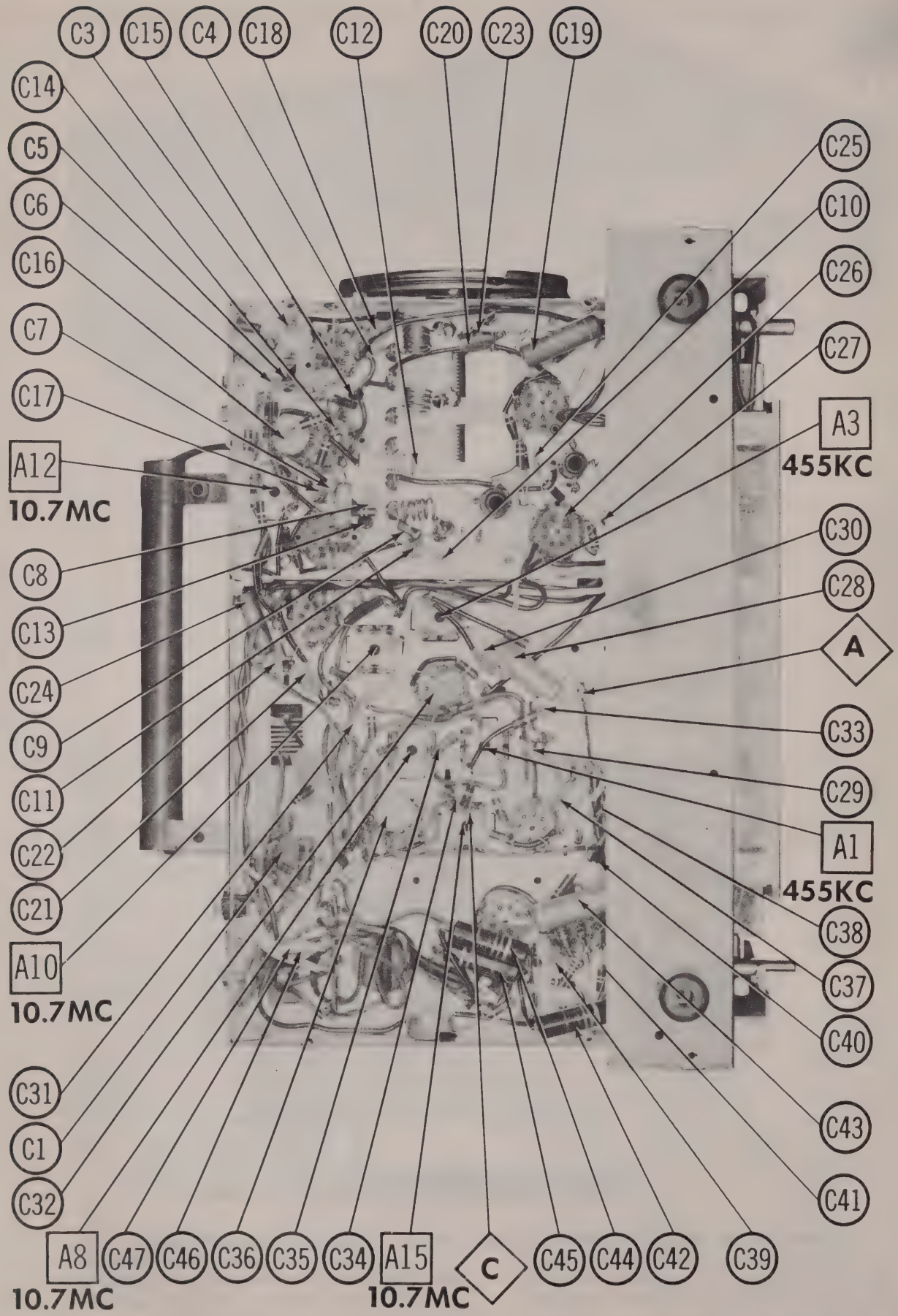


HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

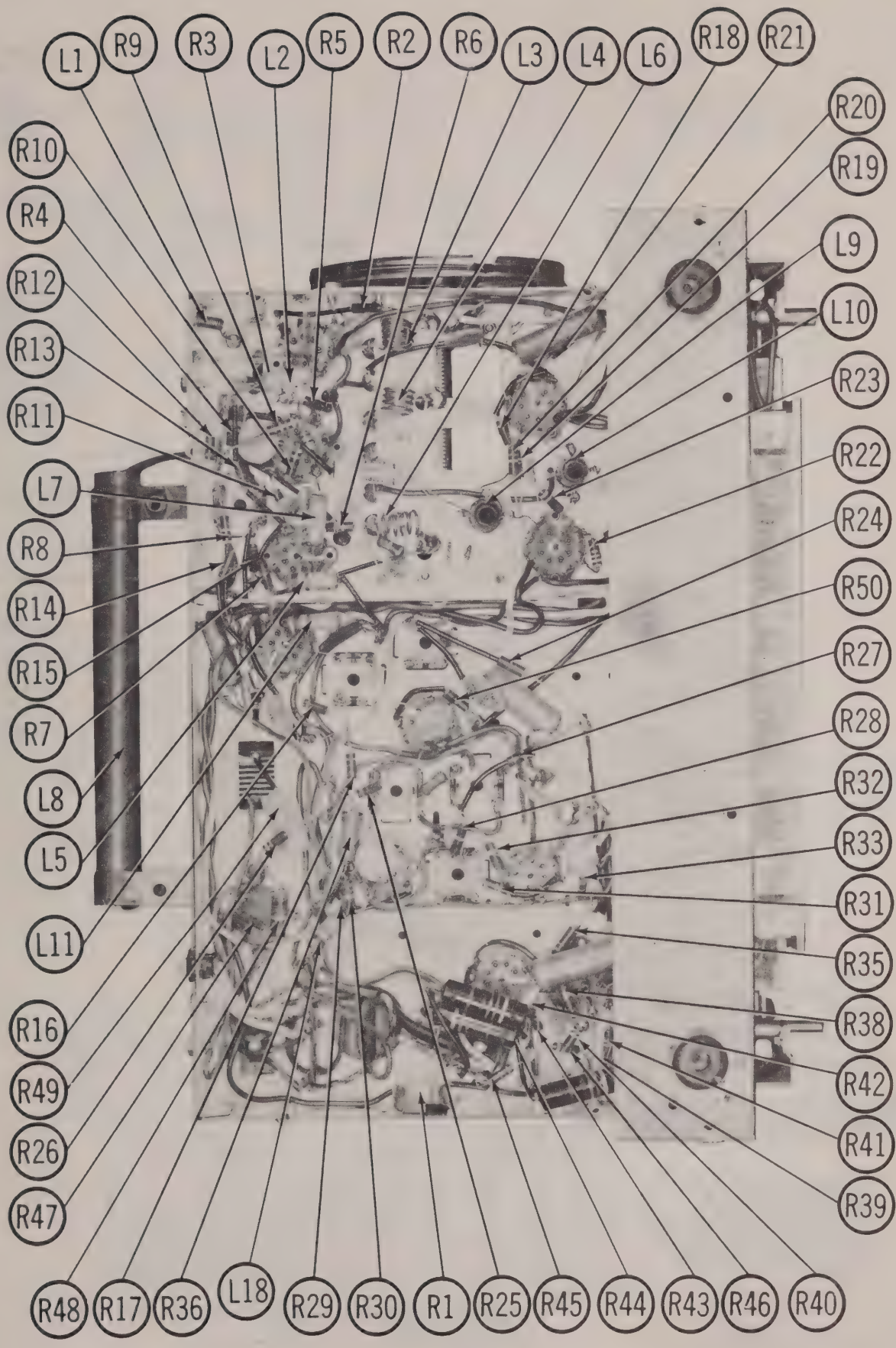
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1959 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

JL250

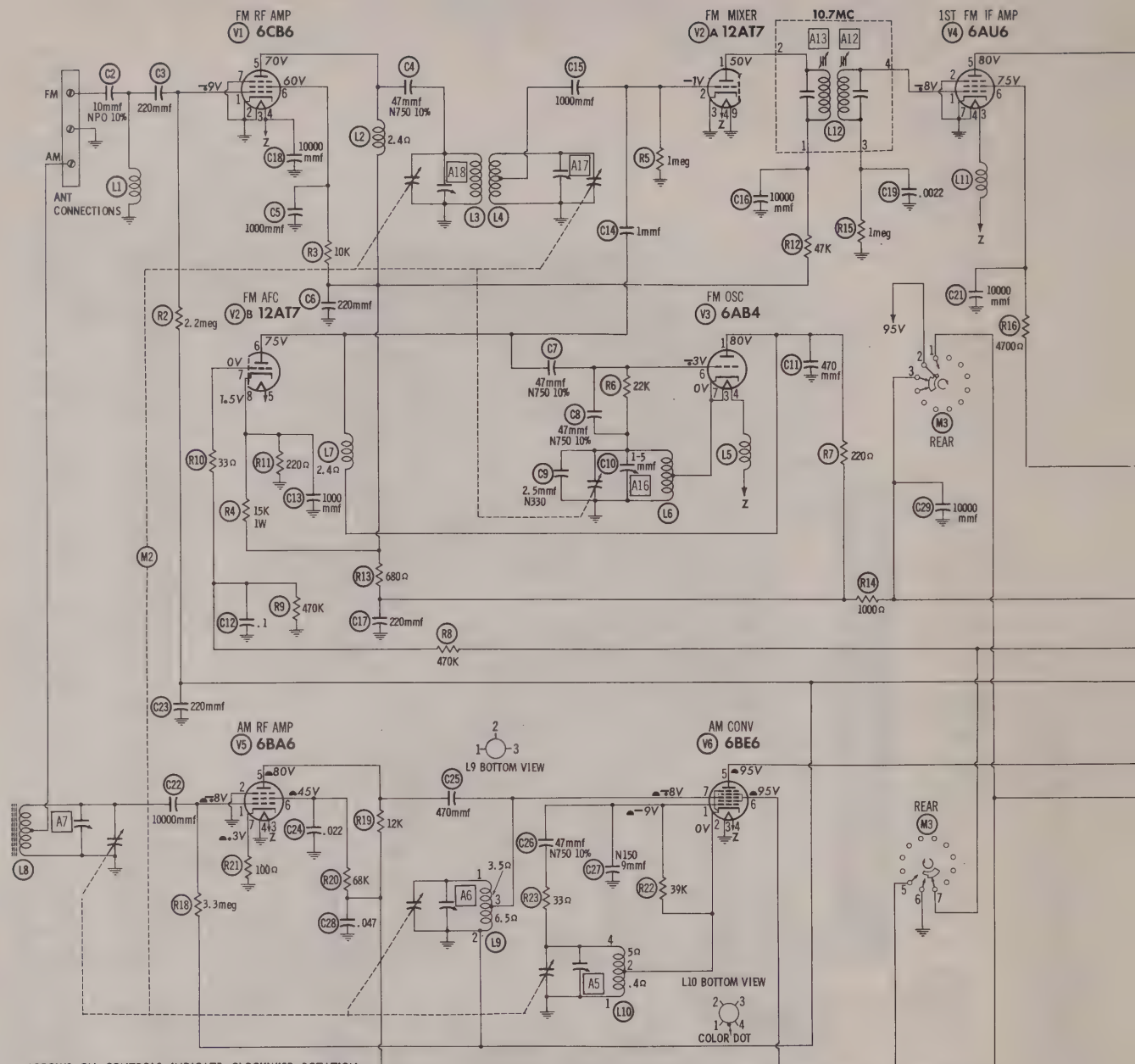
SET 461 FOLDER 7



CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION



CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION



ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

❸ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6CB6	4.6meg	0Ω	0Ω	.1Ω	†3400Ω	†13K	0Ω		
V2	12AT7	†50K	1meg	0Ω	.1Ω	.1Ω	†2900Ω	▪ 600K 270K	220Ω	0Ω
V3	6AB4	†2900Ω	NC	1Ω	0Ω	TP	22K	0Ω		
V4	6AU6	1meg	0Ω	.1Ω	0Ω	†7800Ω	†12K	0Ω		
V5	6BA6	▵5.7meg	▵0Ω	.1Ω	0Ω	†▵13K	†▵70K	▵100Ω		
V6	6BE6	▵39K	▵.4Ω	0Ω	.1Ω	†▵1700Ω	†▵1700Ω	▵2.4meg		
V7	6BA6	2.4meg	0Ω	0Ω	.1Ω	†1000Ω	†5700Ω	68Ω		
V8	6AU6	100K	0Ω	0Ω	1Ω	†11K	†11K	0Ω		
V9	6AL5	0Ω	100K	.1Ω	0Ω	200K	0Ω	100K		
V10	12AU7A	†50K	2.2meg	10K	0Ω	0Ω	†680Ω	7meg	5600Ω	.1Ω
V11	6BF6	2.2meg	14K	0Ω	.1Ω	0Ω	0Ω	†25K		

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
† MEASURED FROM OUTPUT OF M1
▵ MEASURED IN "AM" POSITION ▪ MEASURED IN "FM-AFC" POSITION
NC NO CONNECTION
TP TIE POINT

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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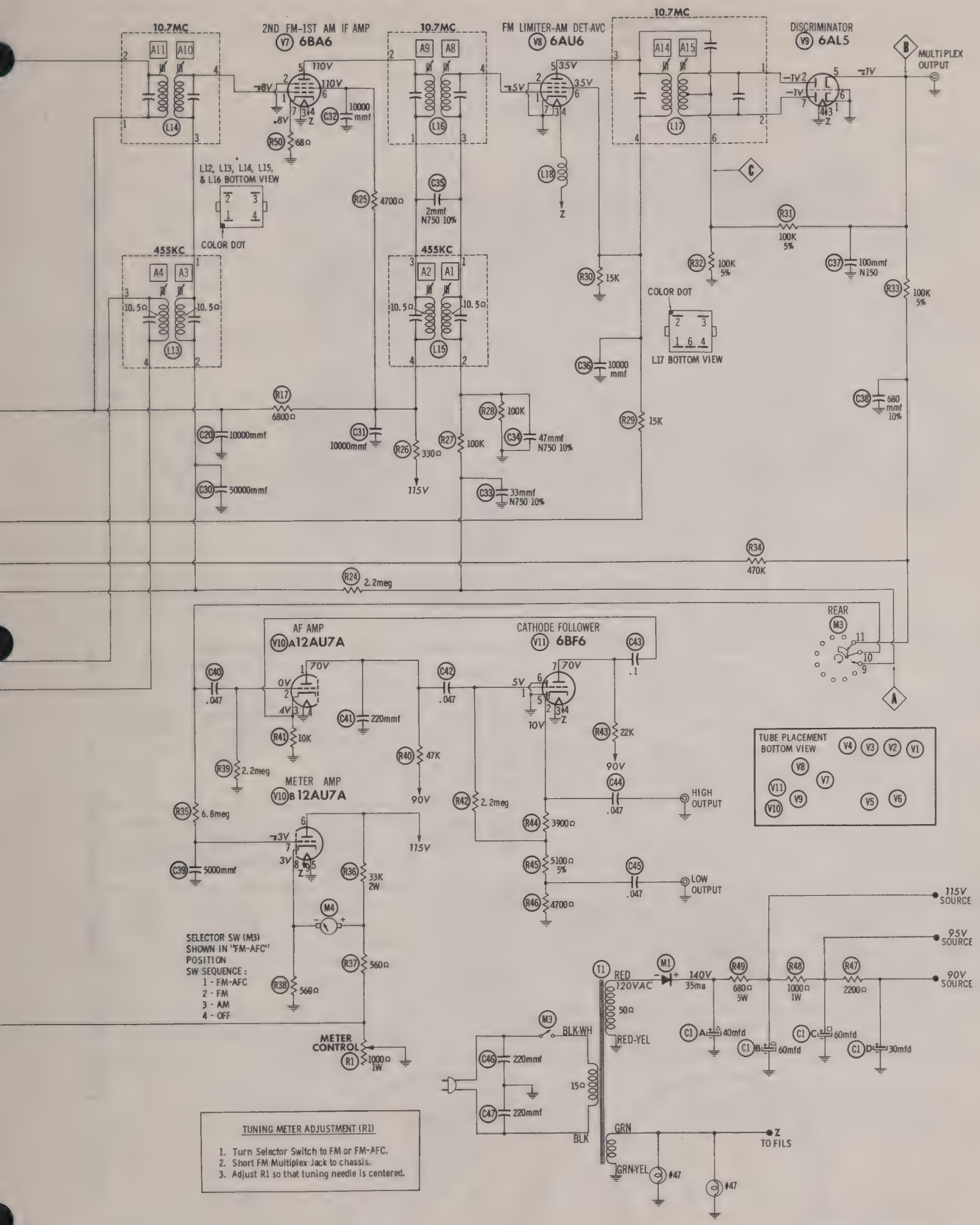


GENERAL ELECTRIC MODELS
FA-10, FA-11, FA-12

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools:
- A1 thru A4, A8 thru A13..... GENERAL CEMENT #5097, 8727 WALSCO #2515
- A5, A6, A7, A16, A17, A18.... GENERAL CEMENT #5004, 5008, 5009 WALSCO #2520
- A14, A15..... GENERAL CEMENT #8282, 8606, 8606L, 9091 WALSCO #2526, 2541, 2543, 2544

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.1mfd	High side to pin 7 (grid) of AM Converter. Low side to chassis.	455KC (400∿ 30% Mod.)	AM	Tuning gang fully open	AC probe to high Output Jack. Common to chassis.	A1, A2, A3, A4	Adjust for maximum deflection.
2.	"	"	1620KC	"	"	"	A5	"
3.	"	High side to pin 1 (grid) of AM RF Amp. Low side to chassis.	1400KC	"	1400KC Signal	"	A6	"
4.	100mmf	High side to AM antenna terminal. Low side to chassis.	"	"	"	"	A7	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.	.001mfd	High side to pin 2 (grid) of FM Mixer. Low side to chassis.	10.7MC (Unmod.)	FM	Tuning gang fully open.	DC probe to point Ⓐ. Common to chassis.	A8, A9, A10, A11, A12, A13	Adjust for maximum deflection.
6.	"	"	"	"	"	DC probe to point Ⓑ. Common to chassis.	A14	"
7.	"	"	"	"	"	DC probe to point Ⓒ. Common to chassis.	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5.	.001mfd	High side to pin 2 (grid) of FM Converter. Low side to chassis.	10.7MC (450KC Swp)	FM	Tuning gang fully open	Vert. amp. to point Ⓐ. Low side to chassis.	A8, A9, A10, A11, A12, A13	Adjust for maximum gain and symmetry of response similar to Fig. 1 with marker as shown.
6.	"	"	"	"	"	Vert. amp. to point Ⓑ. Low side to chassis.	A14	"
7.	"	"	"	"	"	Vert. amp. to point Ⓒ. Low side to chassis.	A15	Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A14 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
8.	270Ω Carbon Resistor	High side thru 270Ω to FM antenna terminal. Low side to chassis.	106MC (Unmod.)	FM	106MC	DC probe to point Ⓐ. Common to chassis.	A16, A17, A18	Adjust for maximum deflection.
9.	"	"	90MC	"	90MC	"	L3, L4, L6	Adjust for maximum deflection. Repeat Steps 8 & 9.

FIG. 1

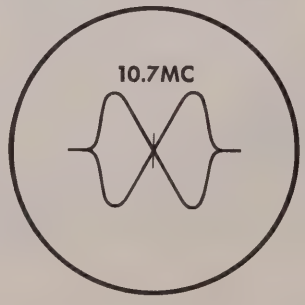


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	FM RF Amplifier	6CB6	V7	2nd FM-1st AM IF Amp.	6BA6
V2	FM Mixer-FM AFC	12AT7	V8	FM Limiter-AM Det. -AVC	6AU6
V3	FM Osc.	6AB4	V9	Discriminator	6AL5
V4	1st FM IF Amplifier	6AU6	V10	AF Amplifier-Meter Amp.	12AU7A
V5	AM RF Amplifier	6BA6	V11	Cathode Follower	6BF6
V6	AM Converter	6BE6			

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA G. E. PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲40	200	ECE-234					TVLS-4479*	
B	▬60	200							
C	■60	200							
D	30	200							

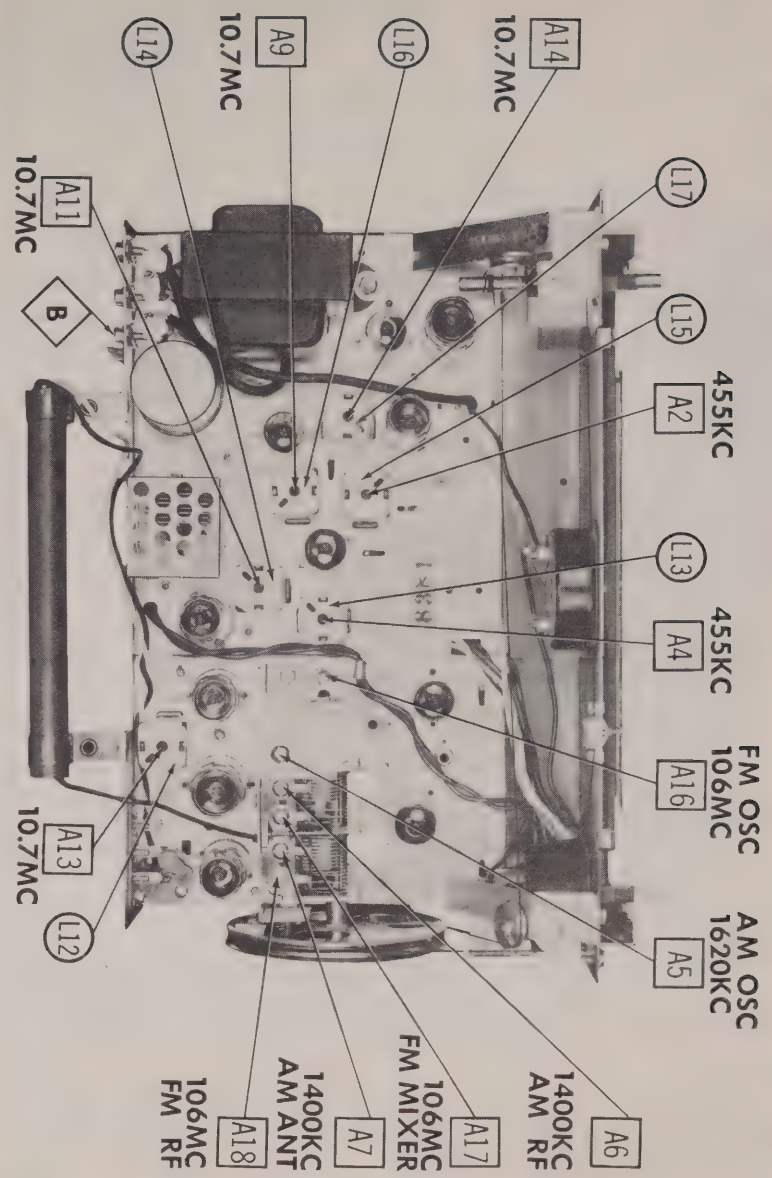
* Not normally in distributors stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	RATING TOL	REPLACEMENT DATA G. E. PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	10		NPO 10%	ECW-3199	NPO-DI 10	DTZ-10	C10Q1C	CNO-410	5TCC-Q1S 10%*	
C3	220			ECW-3190	BPD-00022	DD-221	L10T22	B-322	5GA-T22	
C4	47		N750 10%	ECW-3198	N750-DI 47	DTN-47	C10Q47U	CN7-447	5TCU-Q47S 10%*	
C5	1000			ECW-3187	BPD-001	DD-102	BYA10D1	B-210	5HK-D1	
C6	220			ECW-3190	BPD-00022	DD-221	L10T22	B-322	5GA-T22	
C7	47		N750 10%	ECW-3198	N750-DI 47	DTN-47	C10Q47U	CN7-447	5TCU-Q47S 10%*	
C8	47		N750 10%	ECW-3198	N750-DI 47	DTN-47	C10Q47U	CN7-447	5TCU-Q47S 10%*	
C9	2.5		N330							
C10	1-5					829-6		CT-551		
C11	470			ECW-3191	BPD-00047	DD-470	BYA10T47	B-347	5GA-T47	
C12	.1	100			P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C13	1000			ECW-3187	BPD-001	DD-102	BYA10D1	B-210	5HK-D1	
C14	1mmf				NPO-SI 1	TCZ-1		CNO-510	5TCCB-V1	
C15	1000			ECW-3187	BPD-001	DD-102	BYA10D1	B-210	5HK-D1	
C16	10000			ECW-3192	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C17	220			ECW-3190	BPD-00022	DD-221	L10T22	B-322	5GA-T22	
C18	10000			ECW-3192	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C19	.0022	200			P288N-0022	DD-222	CUB6D22	GEM-6222	6TM-D22	
C20	10000			ECW-3192	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C21	10000			ECW-3192	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C22	10000			ECW-3192	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C23	220			ECW-3190	BPD-00022	DD-221	L10T22	B-322	5GA-T22	
C24	.022	200			P288N-022	DD-203	CUB2S22	GEM-4122	4TM-S22	
C25	470			ECW-3191	BPD-00047	DD-471	BYA10T47	B-347	5GA-T47	
C26	47		N750 10%	ECW-3198	N750-DI 47	DTN-47	C10Q47U	CN7-447	5TCU-Q47	
C27	9		N150	ECW-3197						
C28	.047	400			P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C29	10000			ECW-3192	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C30	50000			ECW-3200	BPD-05	DD-503	CUB2S5	BT-150	5HK-S5	
C31	10000			ECW-3192	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C32	10000			ECW-3192	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C33	33		N750 10%	ECW-3193	N750-DI 33	DTN-33	C10Q33U	CN7-433	5TCU-T33S 10%*	
C34	47		N750 10%	ECW-3198	N750-DI 47	DTN-47	C10Q47U	CN7-447	5TCU-Q47 10%*	
C35	2		N750 10%	ECW-3196	N750-SI 2	TCN-2	C10V2C	CN7-520		
C36	10000			ECW-3192	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C37	100		N150	ECW-3188						
C38	680		10%	ECW-3189	DI-680 10%	DD-681		JL-368	5GA-T68S 10%*	
C39	5000				BPD-005	DD-502	BYA10D5	B-250	5HK-D5	
C40	.047	200			P288N-047	DF-503	CUB2S47	GEM-4147	2TM-S47	
C41	220			ECW-3190	BPD-00022	DD-221	L10T22	B-322	5GA-T22	
C42	.047	200			P288N-047	DF-503	CUB2S47	GEM-4147	2TM-S47	
C43	.1	200			P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C44	.047	200			P288N-047	DF-503	CUB2S47	GEM-4147	2TM-S47	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING			REPLACEMENT DATA						NOTES
	CAP.	VOLT	TOL	G. E. PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C45	.047	200			P288N-047	DF-503	CUB2S47	GEM-4147	2TM-S47	
C46	220			ECW-3190	BPD-00022	DD-221	L10T22	B-322	5GA-T22	
C47	220			ECW-3190	BPD-00022	DD-221	L10T22	B-322	5GA-T22	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	G.E. PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	1000Ω	1(WW)	ERC-360		39-1000	112-1000	FL1K	Meter Control

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	2.2meg	
R3	10K	
R4	15K 1W	
R5	1meg	
R6	22K	
R7	220Ω	
R8	470K	
R9	470K	
R10	33Ω	
R11	220Ω	
R12	47K	
R13	680Ω	
R14	1000Ω	
R15	1meg	
R16	4700Ω	
R17	6800Ω	
R18	3.3meg	

ITEM No.	RATING	REMARKS
R19	12K	
R20	68K	
R21	100Ω	
R22	39K	
R23	33Ω	
R24	2.2meg	
R25	4700Ω	
R26	330Ω	
R27	100K	
R28	100K	
R29	15K	
R30	15K	
R31	100K 5%	
R32	100K 5%	
R33	100K 5%	
R34	470K	
R35	6.8meg	

ITEM No.	RATING	REMARKS
R36	33K 2W	
R37	560Ω	
R38	560Ω	
R39	2.2meg	
R40	47K	
R41	10K	
R42	2.2meg	
R43	22K	
R44	3900Ω	
R45	5100Ω 5%	
R46	4700Ω	
R47	2200Ω	
R48	1000Ω 1W	
R49	680Ω 5W	
R50	68Ω	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		G.E. PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	FM Ant. Coil	ELC-006	19-1000	19-1000	BC-561	4602		.9uh
L2	RF Choke	ELC-003						3.3uh ①
L3	FM RF Coil	ELC-009						
L4	FM Mixer Coil	ELC-010						
L5	Fil. Choke	ELC-004	19-1001	19-1001	BC-562	4604		1.5uh ①
L6	FM Osc. Coil	ELC-007						
L7	RF Choke	ELC-003						3.3uh ①
L8	Loopstick	ELC-008						
L9	AM RF Coil	ELC-002						
L10	AM Osc. Coil	ELC-001			BC-393	71-OSC		
L11	Fil. Choke	ELC-004	19-1001	19-1001	BC-562	4604		1.5uh
L12	1st FM IF	ETL-001	16-3487	16-3487	FM-254	1463		
L13	1st AM IF	ETL-002	16-6758	16-6758	BC-352	12-C1		
L14	2nd FM IF	ETL-001	16-3487	16-3487	FM-254	1463		
L15	2nd AM IF	ETL-002	16-6758	16-6758	BC-353	12-C2		
L16	3rd FM IF	ETL-001	16-3487	16-3487	FM-254	1463		
L17	Discriminator	ETD-001	17-3494	17-3494	FM-253	1464		
L18	Fil. Choke	ELC-004	19-1001	19-1001	BC-562	4604		1.5uh ①

① IRC Part #C1A

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	G. E. PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V Ⓐ .375A	120V Ⓐ .040A	6.3V Ⓐ 3.9A	ETP-333						

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	G.E. PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.035A	EER-012①	1234AH①	RS075 ①	78①		① Selenium Type

MISCELLANEOUS

ITEM No.	PART NAME	G. E. PART No.	NOTES
M2	Tuning Cap.	ECT-001	3 gang (Ant. 23—373mmf, RF. 14—244mmf, Osc. 22—169mmf
M3	Switch	ESW-115	Selector
M4	Meter	EDV-001	Tuning

CABINETS & CABINET PARTS

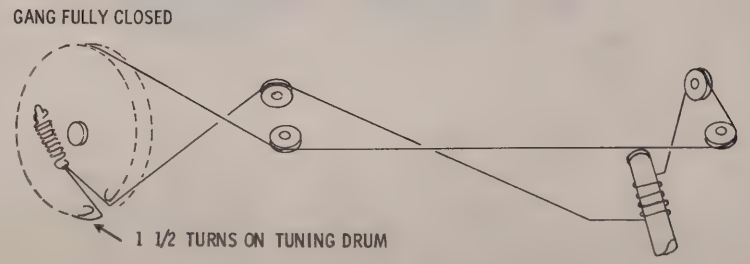
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	EDK-549	Tuning, Brown
Knob	EDK-551	Tuning, Grey
Knob	EDK-556	Tuning, Gold
Knob	EDK-548	Selector, Brown
Knob	EDK-550	Selector, Grey
Knob	EDK-555	Selector, Gold
Pointer	EDP-001	
Dial Scale	EDS-001	
Cabinet	EAV-1007	Russet Brown
Cabinet	EAV-1008	Gray
Cabinet	EAV-1010	Saddle Brown

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)



DIAL CORD STRINGING

PHOTOFACT* Folder

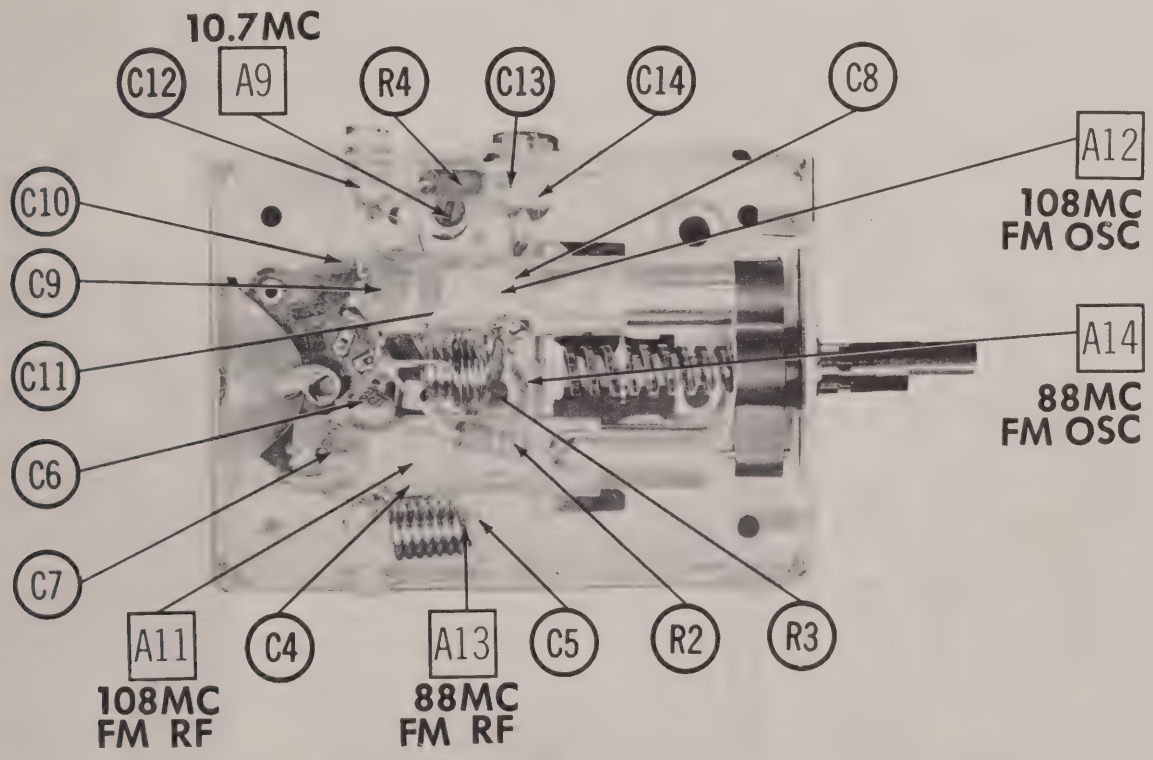
EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

GRANCO
MODEL 701

GRANCO
MODEL 701

TRADE NAME	Granco Model 701		
MANUFACTURER	Granco Products, Inc., 36-07 20th Ave., Long Island City 5, N. Y.		
TYPE SET	AC-DC Operated 6 Tube FM-AM Receiver		
POWER SUPPLY	110 - 120 Volts AC-DC	RATING	32 Watts, .36 Amp. @117 Volts AC
TUNING RANGE—BROADCAST	535 - 1650KC	FREQ. MOD.	88 - 108MC

GRANCO
MODEL 701



HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1959 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

JK300

SET 461 FOLDER 8

PARTS LIST AND DESCRIPTIONS

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆

ITEM No.	USE	TYPE
V1	FM RF Amp. -FM Conv.	12DT8
V2	AM Converter	12BE6
V3	1st FM-AM IF Amp.	12BA6
V4	2nd FM IF Amp. -AM Det.	12BA6
V5	Ratio Det. -AF Amp.	19T8
V6	Output	50C5

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA GRANCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲80	150	41-5	AFH2-19	XB0181	FP216	TMD-17	TVL-2442.1	
B	■50	150							
C2	2	50		SRE50V2	NLW2-100	TT150X2	ML2-50	TE-1301	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	RATING TOL	REPLACEMENT DATA GRANCO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C3	50				SI 50	D6-500	L10Q5	UC-545	5GA-Q5	
C4										
C5	1000				EF-001	MFT-1000			503C-D1	
C6	15		N750 5%			DTN-15	C10Q15U	CN7-415	5TCU-Q15S 5%*	
C7	9		N80 5%							
C8										
C9	8.5		N80 5%							
C10	68		N750 10%		N750-DI 68	DTN-68	C10Q68U	CN7-468	5TCU-Q68S 10%*	
C11	5		N220 5%							
C12	450								503C-T47	
C13	1000				EF-001	MFT-1000			503C-D1	
C14	1000				EF-001	MFT-1000			503C-D1	
C15	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C16	5		5%		NPO-SI 5	DD-050	C10V5C	Z-555	MS-55	
C17	4700				BPD-0047	DD-472	BYA10D47M	B-247	5HK-D47	
C18	470				BPD-00047	DD-471	BYA10T47	B-347	5GA-T47	①
C19	1500				BPD-0015	DD-152	BYA10D15	B-215	5GA-D15	
C20	6.8		N750 10%		N750-DI 6.8		C10V68U	CN7-568	5TCU-V68S 10%*	
C21	1500				BPD-0015	DD-152	BYA10D15	B-215	5HK-D15	
C22	1500				BPD-0015	DD-152	BYA10D15	B-215	5HK-D15	②
C23	4700				BPD-0047	DD-472	BYA10D47M	B-247	5HK-D47	
C24	220				BPD-00022	DD-221	L10T22	B-322	5GA-T22	
C25	4700				BPD-0047	DD-472	BYA10D47M	B-247	5HK-D47	
C26	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C27	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C28	1500				BPD-0015	DD-152	BYA10D15	B-215	5HK-D15	
C29	1500				BPD-0015	DD-152	BYA10D15	B-215	5HK-D15	
C30	1500				BPD-0015	DD-152	BYA10D15	B-215	5HK-D15	

① Some versions may use 1500mmf in this application.
② Some versions may use 100mmf in this application.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA GRANCO PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1meg	½	45-18A	B-69	A47-1meg-Z	Q11-137	U54	Volume
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			KR-1	SWE-12	76-1	US-26	Off-On

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	47K	
R3	2200Ω	
R4	5600Ω	
R5	47K	(22K) *
R6	1.5meg	
R7	330Ω	
R8	100K	
R9	1.5meg	
R10	1.5meg	
R11	330Ω	
R12	1meg	
R13	47K	
R14	4.7meg	
R15	220K	
R16	470K	
R17	160Ω	
R18	900Ω 4W	
R19	22Ω	
R20	470Ω 1W	

* Alternate

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	GRANCO PART No.	REPLACEMENT DATA
K1	Ratio Detector Load	1500mmf, 22K		

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA GRANCO PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Loopstick				BC-393			
L2	Osc. Coil							
L3A	1st FM IF Trans.	28-6						
B	1st AM IF Trans.							
L4A	2nd FM IF Trans.	28-7						
B	2nd AM IF Trans.							
L5	Ratio Detector	CL-473	17-3498	17-3498	FM-255	1465		

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA GRANCO PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	2600Ω	3-4Ω	33-3-1	24S53①	A-3025①	AU-605①	S-3332①	24S53 ①	S-12X①	① Bend Ears Down

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	REPLACEMENT DATA GRANCO PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3-4Ω	34-7-1	4A1	

RECTIFIERS

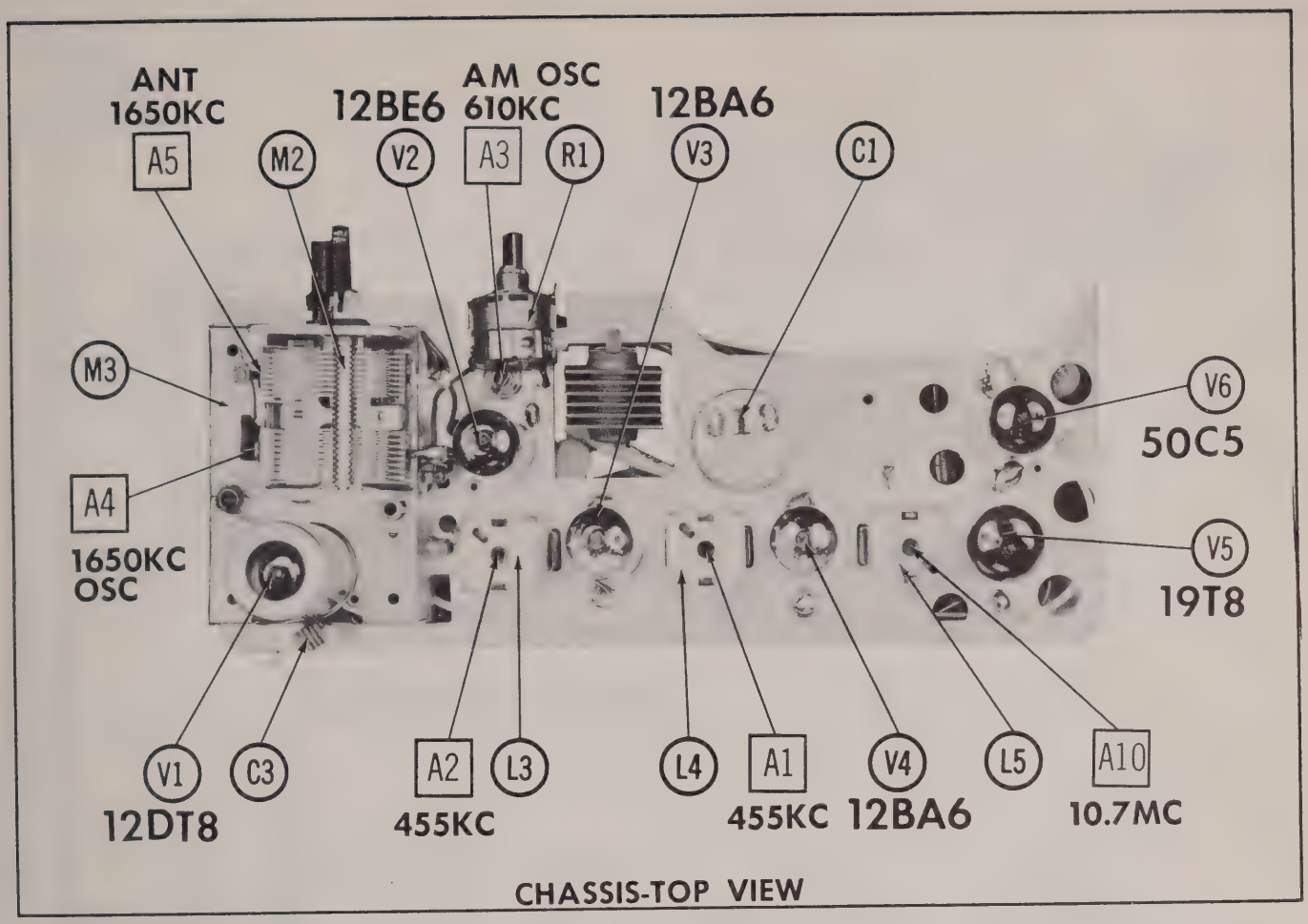
ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA GRANCO PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	NOTES
M1	.042A	B457①	1235AH ①	T100 ①	100A①		① Selenium Type

MISCELLANEOUS

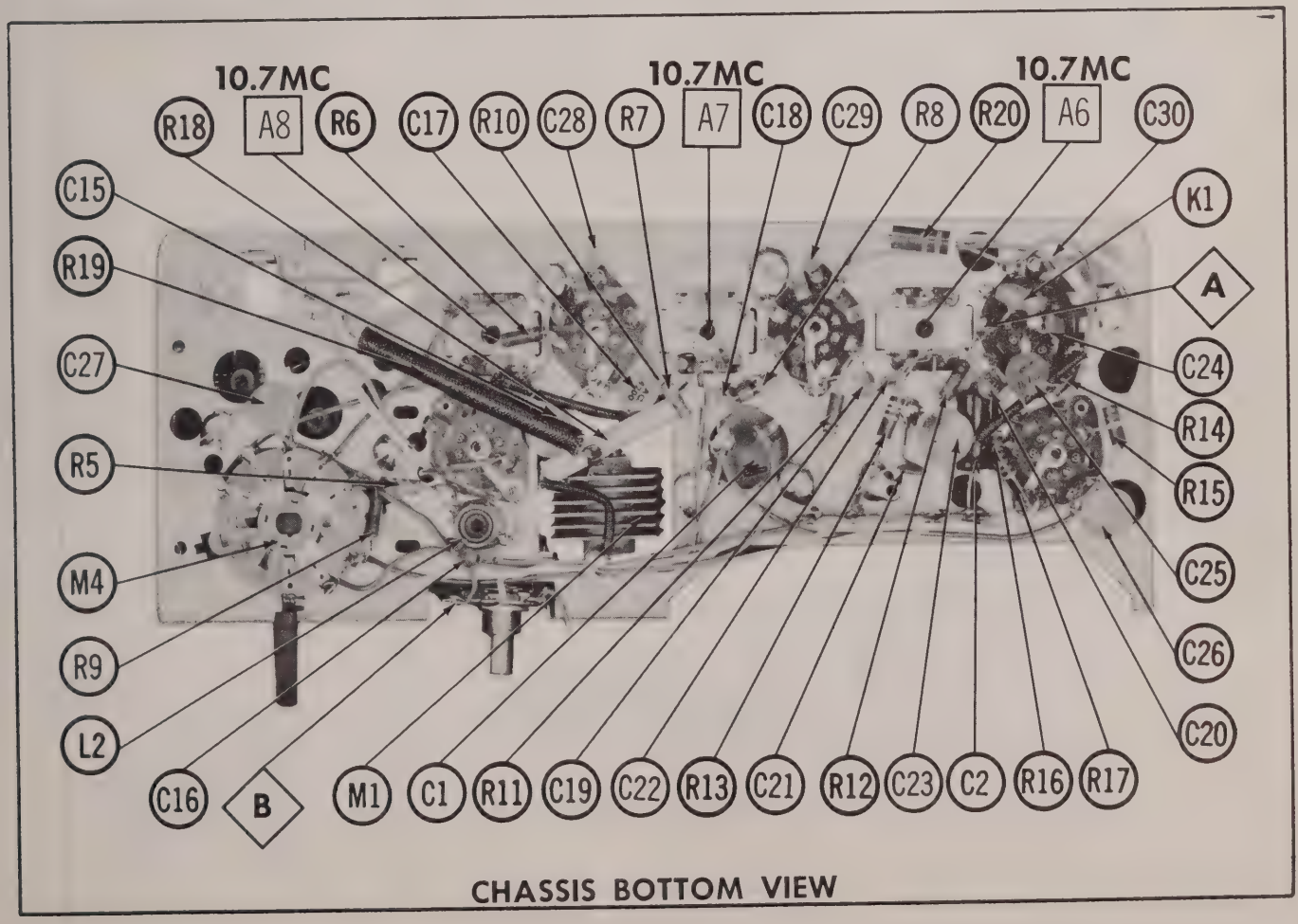
ITEM No.	PART NAME	GRANCO PART No.	NOTES
M2	Tuning Cap		AM 2 Gang(Ant. 14—234mmf, Osc. 16—119mmf)
M3	Tuner Unit		FM
M4	Switch		FM-AM (Rotary Wafer Type)

CABINETS & CABINET PARTS

When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color



CHASSIS-TOP VIEW



CHASSIS BOTTOM VIEW

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1mfd capacitor in series with low side of signal generator.
Volume control should be at maximum position, Output of signal generator should be no higher than necessary to obtain an output reading.
Suggested alignment tools:

A1, A2, A3, A7, A8	GENERAL CEMENT #8606, 8606L, 8282, 9295 WALSCO #2526, 2543, 2544, 2545
A4, A5	GENERAL CEMENT #5004, 5008, 5009 WALSCO #2520
A6, A10	GENERAL CEMENT #5097, 8727 WALSCO #2515
A11, A12	GENERAL CEMENT #8282, 8606, 8606L, 9091 WALSCO #2526, 2541, 2543, 2544

AM ALIGNMENT

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	High side thru .1mfd to pin 7 (grid) of AM converter. Low side to chassis.	455KC (400∿ Mod.)	Tuning gang fully open	Across voice coil	A1, A2	Adjust for maximum output.
2.	Loop	610KC	Tune to 610KC signal	"	A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. Rock tuning gang.
3.	Loop	1650KC	Tuning gang fully open	"	A4, A5	Adjust for maximum output. Repeat Steps 1, 2 and 3.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100K (± 1%) resistors in series from point Ⓐ to chassis. The junction of these two resistors is alignment point Ⓒ as shown on the schematic. Disconnect Hank antenna.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	High side thru 50mmf (ceramic) to pin 8 (cathode) of FM RF Amp. Low side to chassis.	10.7MC (Unmod.)	Point of non-interference.	DC probe to point Ⓐ. Common to chassis.	A6, A7, A8, A9	Adjust for maximum deflection.
5.	"	"	"	DC probe to point Ⓑ. Common to point Ⓒ	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	High side thru 50mmf ceramic to pin 8 (cathode) of FM RF Amp. Low side to chassis.	10.7MC (450KC Swp)	Point of non-interference	Vert. amp to point Ⓐ. Low side to chassis.	A6, A7, A8, A9	Disconnect stabilizing capacitor C2. Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown.
5.	"	"	"	Vert. amp to point Ⓑ. Low side to chassis.	A10	Reconnect C2. Adjust to place marker at the center of cross-over lines similar to Fig. 2. SLIGHTLY retouch A6 for maximum amplitude and straightness of crossover lines.

RF ALIGNMENT

	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	High side thru 50mmf (ceramic) to pin 8 (cathode) of FM RF Amp. Low side to chassis.	108MC (Unmod.)	108MC	DC probe to point Ⓐ. Common to chassis.	A11, A12	Adjust for maximum deflection.
7.	"	88MC	88MC	"	A13, A14	Adjust A13 and A14 (Padder flaps) for maximum deflection. Repeat Steps 6 & 7.

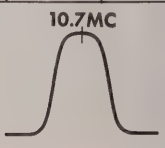


FIG. 1

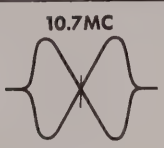
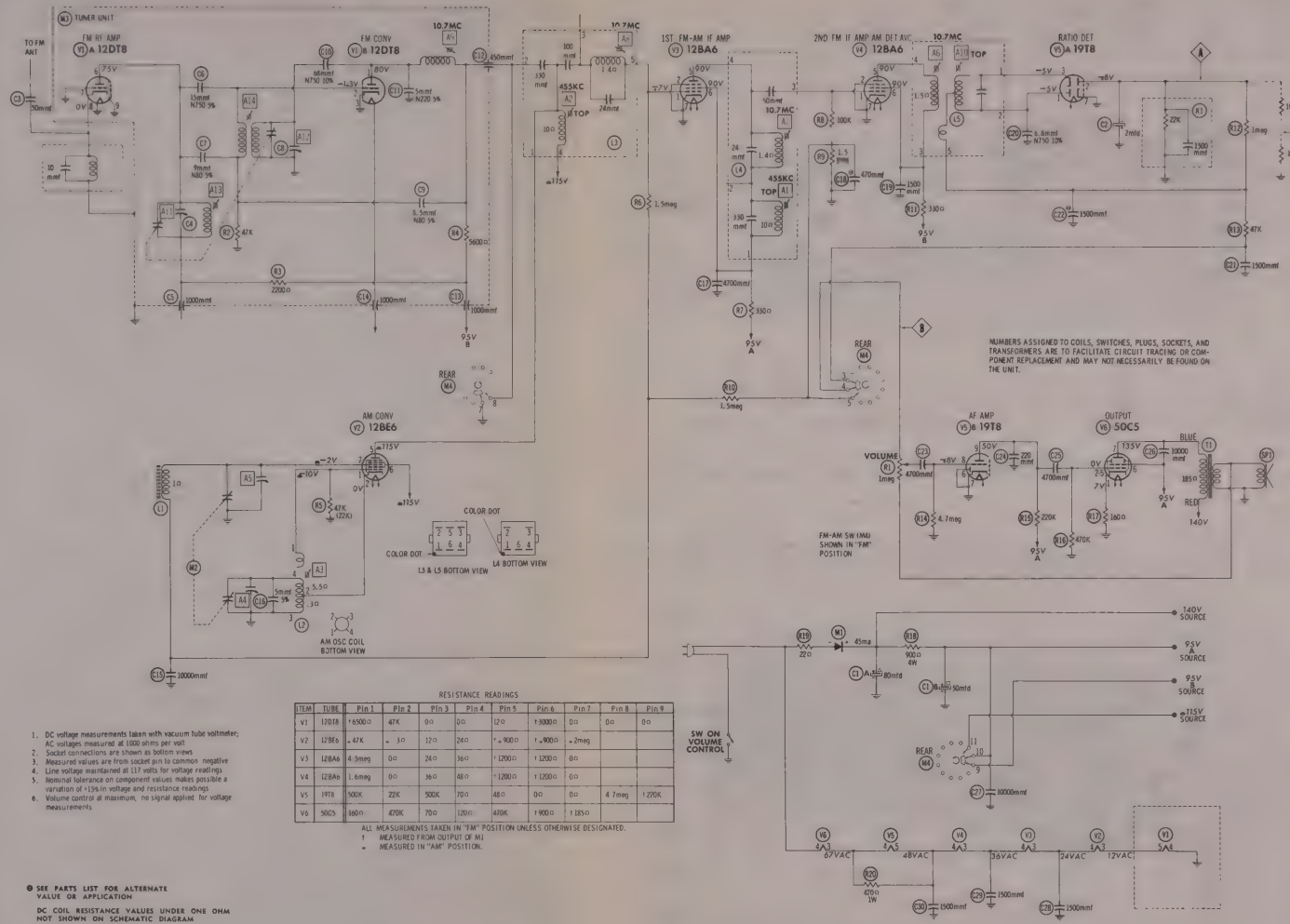


FIG. 2



NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12DT8	†6500Ω	47K	0Ω	0Ω	12Ω	†3000Ω	0Ω	0Ω	0Ω
V2	12BE6	±47K	± 3Ω	12Ω	24Ω	*± 900Ω	†± 900Ω	±2meg		
V3	12BA6	4.5meg	0Ω	24Ω	36Ω	†1200Ω	†1200Ω	0Ω		
V4	12BA6	1.6meg	0Ω	36Ω	48Ω	†1200Ω	†1200Ω	0Ω		
V5	19T8	500K	22K	500K	70Ω	48Ω	0Ω	0Ω	4.7meg	†270K
V6	50C5	160Ω	470K	70Ω	120Ω	470K	†900Ω	†185Ω		

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
† MEASURED FROM OUTPUT OF M1
* MEASURED IN "AM" POSITION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt
2. Socket connections are shown as bottom views
3. Measured values are from socket pin to common negative
4. Line voltage maintained at 117 volts for voltage readings
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings
6. Volume control at maximum, no signal applied for voltage measurements

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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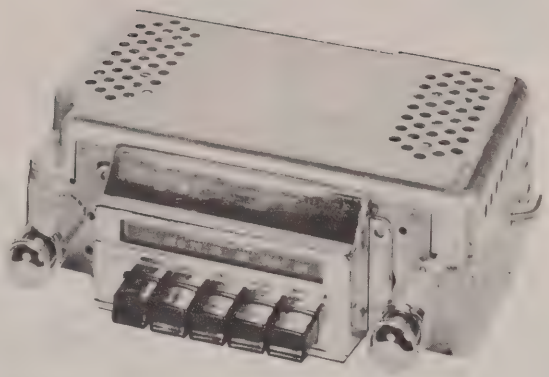
GRANCO MODEL 701

PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

INTERNATIONAL MODEL 94MI

INTERNATIONAL
MODEL 94MI



TRADE NAME	International Model 94MI (For 1959 R And V Line International Trucks)
MANUFACTURER	Motorola Inc., 4545 W. Augusta Blvd., Chicago 51, Illinois
TYPE SET	Battery Operated 5 Tube Custom Built AM Truck Receiver With Transistorized Output
POWER SUPPLY	12 Volt Storage Battery — RATING 1.9 Amp. @ 12.6 Volts DC
TUNING RANGE—BROADCAST	540 — 1610KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools:

A1 thru A4.....GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545

A5, A6, A7..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

A8, A9, A10.... GENERAL CEMENT #9050L, 9150
WALSCO #2521

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to antenna receptacle. Low side to chassis.	262.5KC (400~ Mod.)	High Freq. end stop	Across voice coil	A1, A2, A3, A4	Adjust for maximum deflection.
2.	Fig. 1	Thru dummy to antenna receptacle.	1610KC	"	"	A5, A6, A7	"
	Step 3 is not necessary unless tuner has been tampered with or associated components have been replaced. If necessary, back tuning cores (A8, A9, A10) 7/16" out of coils. Repeat Step 2.						
3.	Fig. 1	Thru dummy to antenna receptacle.	1200KC	Tuner carriage 9/32" from high end stop.	Across voice coil	A8, A9, A10	Adjust for maximum output. Repeat Steps 2 and 3. Cement cores.
4.	With radio installed in car and antenna fully extended, tune in a weak station near 1400KC and adjust A7 for maximum output.						

PUSHBUTTON ADJUSTMENT

1. Pull pushbutton out.
2. Tune manually to desired station.
3. Press button in firmly.
4. Repeat for remaining pushbuttons.

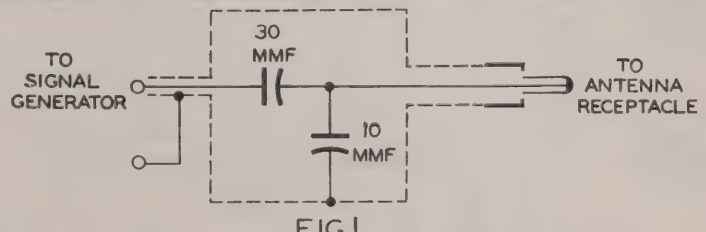


FIG. 1

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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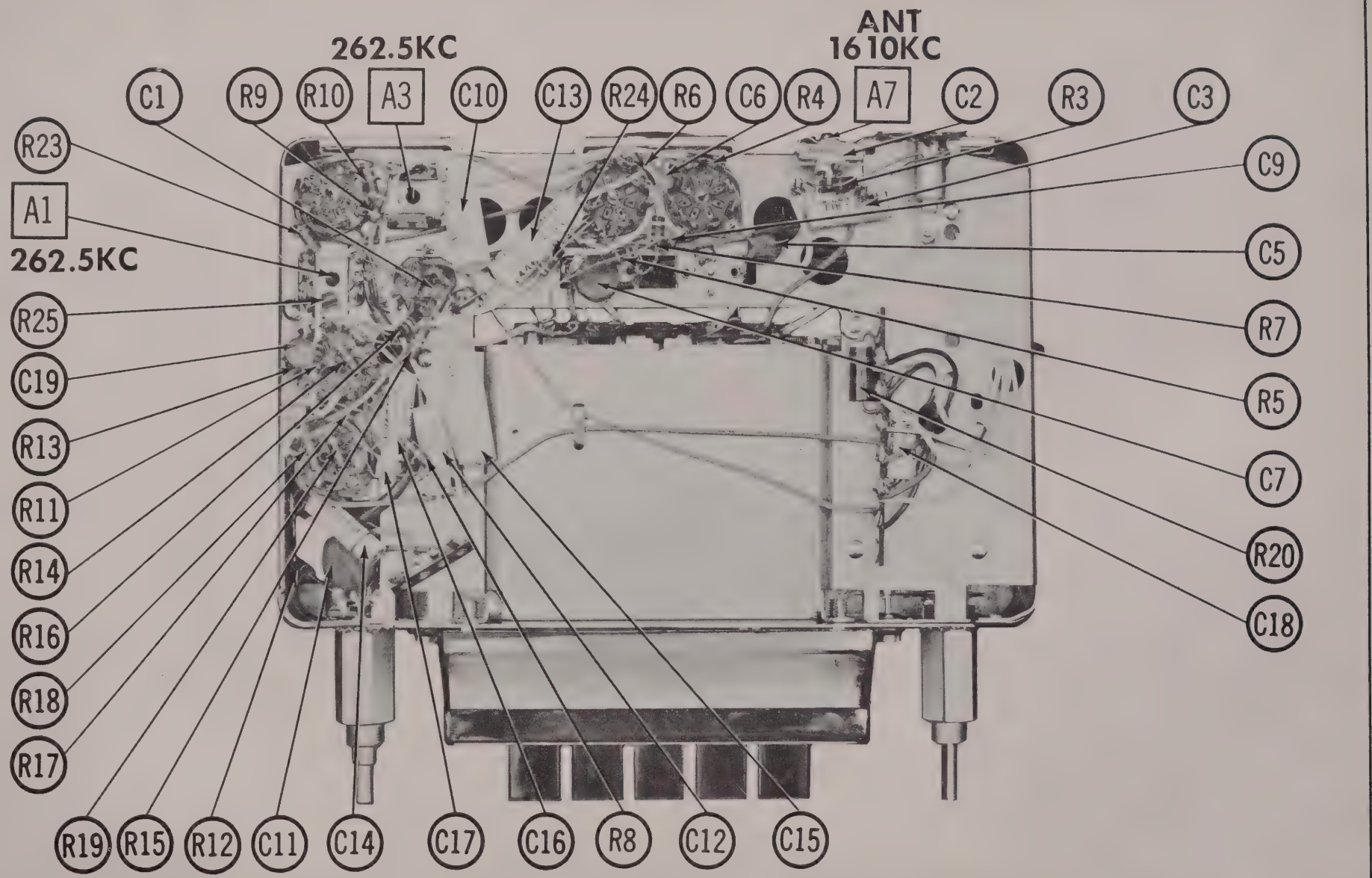
SET 461 FOLDER 9



CHASSIS BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆			◆ RAYTHEON ◆ SYLVANIA ◆		
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	RF Amplifier	12BL6	V4	Det. -AVC-AF Amp.	12F8
V2	Converter	12AD6	V5	Driver	12K5
V3	IF Amplifier	12BL6			

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N176	Output	2N155	2N176		2N176	PNP Note 1

Note 1. When replacing, apply DC-4 grease (Part #11M490487) to both sides of insulator. Tighten mounting screws securely.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	■ 500	16	23B560487	AFH3-00-90		WP300.8		TVLS-3026 *	
B	▲ 100	16							
C	100	16							

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING			REPLACEMENT DATA						NOTES
	CAP.	VOLT	TOL	MOTOROLA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	40-430			20A543178				GEM-1622	10TM-D2	
C3	.002	1000	10%	8RI22291						
C4	20-120			20K541014						
C5	47		N750 10%	21RI14207	N750-DI 47	DTN-47	C10Q47U	CN7-447	5TCU-Q47S 10%*	
C6	1500			21RI20100	BPD-0015	DD-152	BYA10D15	B-215	5HK-D15	
C7	100		N750 10%	21R410036	N750-DI 100	DTN-100	C10T1U	CN7-310	5TCU-T1S 10%*	
C8	310-390			20K541700						
C9	47		N750	21RI14207	N750-DI 47	DTN-47	C10Q47U	CN7-447	5TCU-Q47S 10%*	
C10	.05	200		8RI21005	P288N-05	DF-503	CUB2S5	GTM-215	2TM-S5	
C11	10000			21RI21946	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C12	.002	600		8RI21568	P688N-002	DD-202	CUB6D2	GTM-622	6TM-D2	
C13	.05	200		8RI21005	P288N-05	DF-503	CUB2S5	GTM-215	2TM-S5	
C14	.01	200		8RI21868	P288N-01	DD-103	CUB4S1	GTM-211	4TM-S1	
C15	.05	200		8RI21005	P288N-05	DF-503	CUB2S5	GTM-215	2TM-S5	
C16	.01	200		8RI21868	P288N-01	DD-103	CUB4S1	GTM-211	4TM-S1	
C17	330			21R410118	BPD-00033	DD-331	L10T33	B-333	5GA-T33	
C18	.02	200		8RI21003	P288N-02	DD-203	CUB2S2	GTM-212	2TM-S2	
C19	27		NPO 10%	21R410089		TCZ-27	C10Q27C	CNO-427	5TCC-Q27S 10%*	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

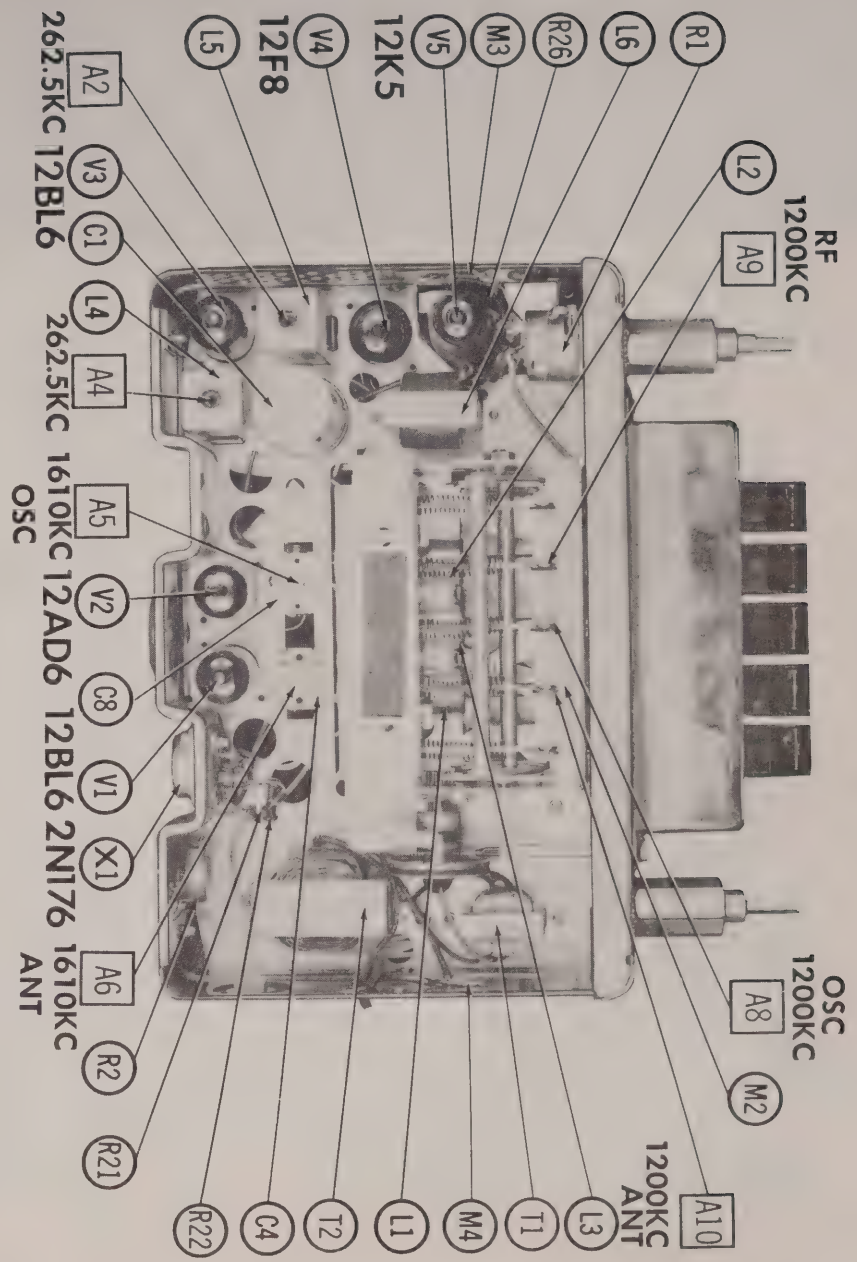
CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	18B562339	F1-41	RTV-639C	■ QJ-1086A	UE1499-S	Tone
B	2meg			R2-75	Not Req.			Volume, Tap@1meg
C	Switch			KR-4	Not Req.			Off-On
R2	125Ω	1(WW)	18K542493		39-125	112-150	FL-150	Bias

■ "Concentrikit" equivalent: K-6 kit with base elements & shafts: B13-133, P13-122, (Panel) B18-139X, R1-205, (Rear) 76-1 (Switch)

▲ "STA-LOC" equivalent: FA55A, RU26T16, OS1687, IS2187, US-41.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R3	22K	
R4	22meg	
R5	3300Ω	
R6	22meg	
R7	47K	
R8	5.6meg	
R9	91meg	
R10	330Ω	

ITEM No.	RATING	REMARKS
R11	4.7meg	
R12	100K	
R13	3.3meg	
R14	6.8meg	
R15	120K	
R16	270K	
R17	3.3meg	
R18	270Ω	

ITEM No.	RATING	REMARKS
R19	27Ω	
R20	47Ω 2W	
R21	10Ω	
R22	4.5Ω Cold	(#6K542967)
R23	150Ω	
R24	470Ω	
R25	22K	
R26	220Ω	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		MOTOROLA PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Ant. Coil	24C535458 †						
L2	RF Coil	24C535458 †						
L3	Osc. Coil	24C535456 †						
L4	Input IF	24K542491	16-6752	16-6752	BC-350	12-H1	RF-3	Note 1
L5	Output IF	24K542675	16-6754	16-6754	BC-354	12-H6		Note 2

† Part of M2, Part #77D562346.
Note 1. Alt. Part #24B542748.
Note 2. Alt. Part #24K542749.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ~)	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L6	1.9A	.3Ω	.005 HY	25C561326						

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	6.5	1	25K543009						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE	REPLACEMENT DATA							NOTES
	PRI.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	24Ω Tap@ 3-4Ω	25C542489							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	QUAM PART No.	
SP1	5"x 7"	PM	3-4Ω	50C532450	57A21	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			MOTOROLA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	SFE	9A 32V	65R16248	9K562566	307009. (SFE 9A 32V)	155009	SFE 9	HR11

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M2	Tuner	77D562346	(AT-268) Complete
M3	Spark Plate	64K530177	
M4	Spark Plate	64K535152	

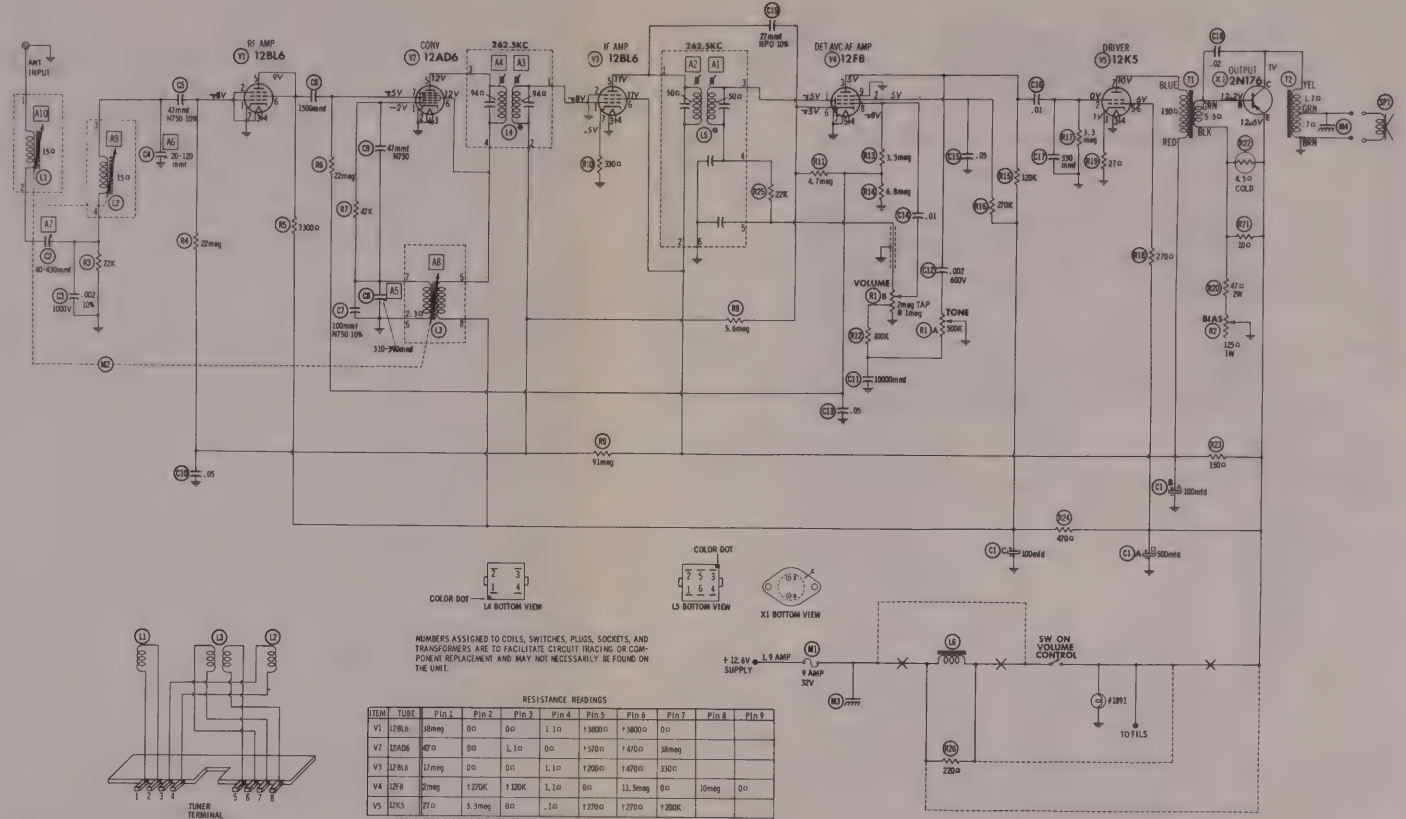
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	1V537883	Tuning, Volume
Knob	36B473538	Tone
Knob	36K592304	Dummy
Pushbutton	38K540188	
Pointer	1V562879	
Dial Scale	34B562340	
Dial Escutcheon	13C513450	

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Shielded Hook-up Wire ..... Use BELDEN No. 8885
Bonding Strap ..... Use BELDEN No. 8661



NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12BL6	38meg	0Ω	0Ω	1.1Ω	†3800Ω	†3800Ω	0Ω		
V2	12AD6	47Ω	0Ω	1.1Ω	0Ω	†570Ω	†470Ω	38meg		
V3	12BL6	17meg	0Ω	0Ω	1.1Ω	†200Ω	†470Ω	330Ω		
V4	12F8	12meg	†270K	†120K	1.1Ω	0Ω	11.5meg	0Ω	10meg	0Ω
V5	12K5	27Ω	3.3meg	0Ω	.1Ω	†270Ω	†270Ω	†200K		

TRANSISTOR CIRCUIT RESISTANCE NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.
† MEASURED FROM JUNCTION OF R23 AND R24.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections shown as bottom views.
3. Measured values are from socket pin to common negative
4. Battery voltage maintained at 12.6 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

TRANSISTOR CURRENT ADJUSTMENT (R2)

Connect a 0-1A DC ammeter (.05Ω max. internal resistance) from transistor collector to chassis. Connect a power source of 12.6 VDC to the receiver and adjust R2 for 360MA. If a power source of 14VDC is used, adjust R2 for 440MA.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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INTERNATIONAL MODEL 94MI

PHOTOFACT* Folder

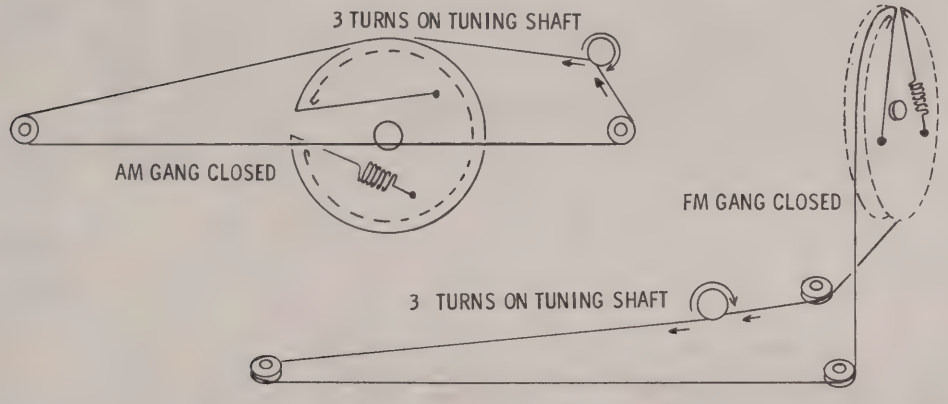
KNIGHT MODEL KN130 (92SU421)

KNIGHT MODEL
KN130 (92SU421)

KNIGHT MODEL
KN130 (92SU421)

TRADE NAME	Knight Model KN130 (92SU421)		
SUPPLIER	Allied Radio Corp., 100 N. Western Ave., Chicago 80, Illinois		
TYPE SET	AC Operated 8 Tube FM-AM Tuner		
POWER SUPPLY	110-120 Volts AC, 60 Cycles	RATING	21 Watts, .25 Amp. @ 117 Volts AC (FM)
TUNING RANGE	BROADCAST 535 - 1650KC	FREQ. MOD.	88 - 108MC

DIAL CORD STRINGING



HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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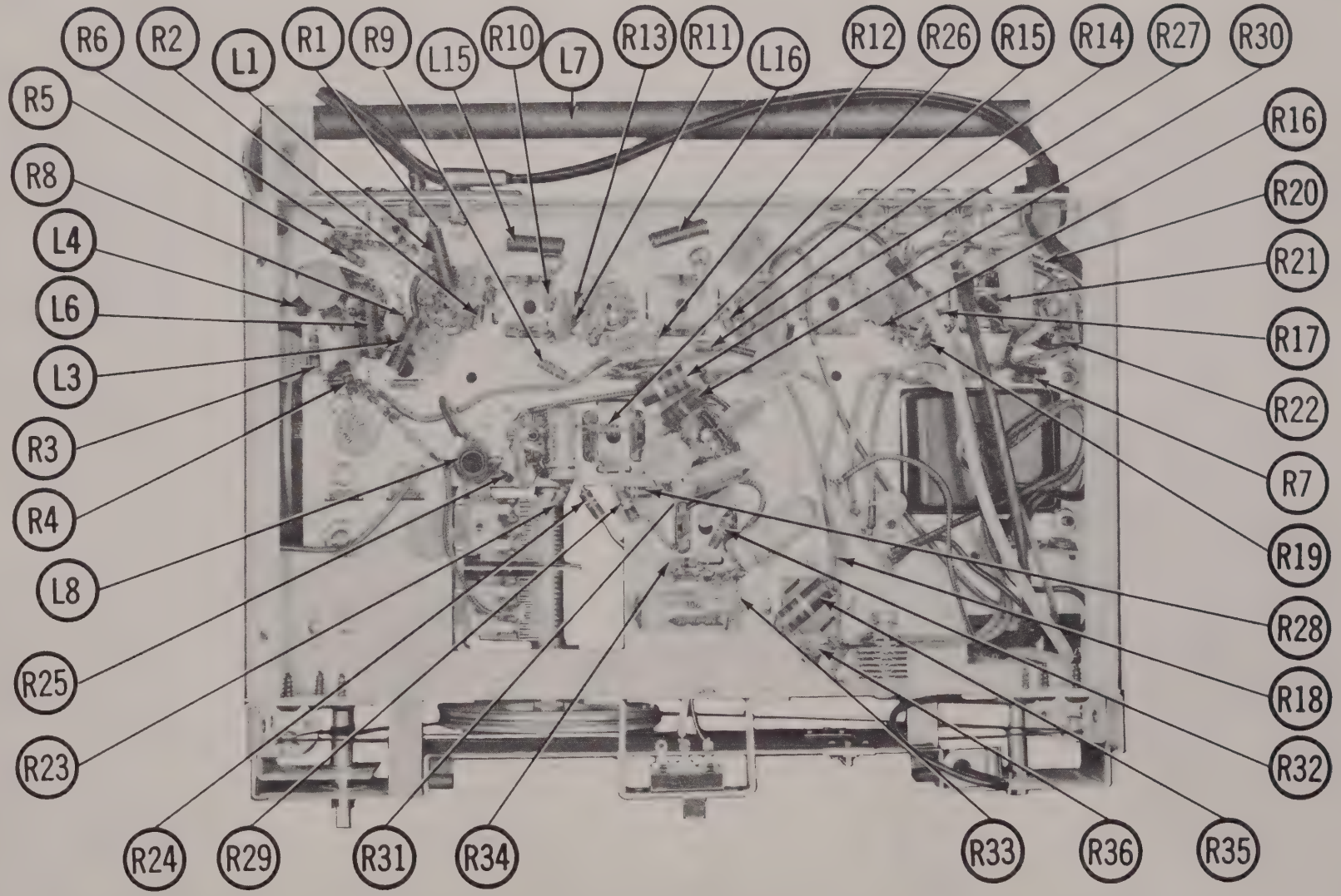
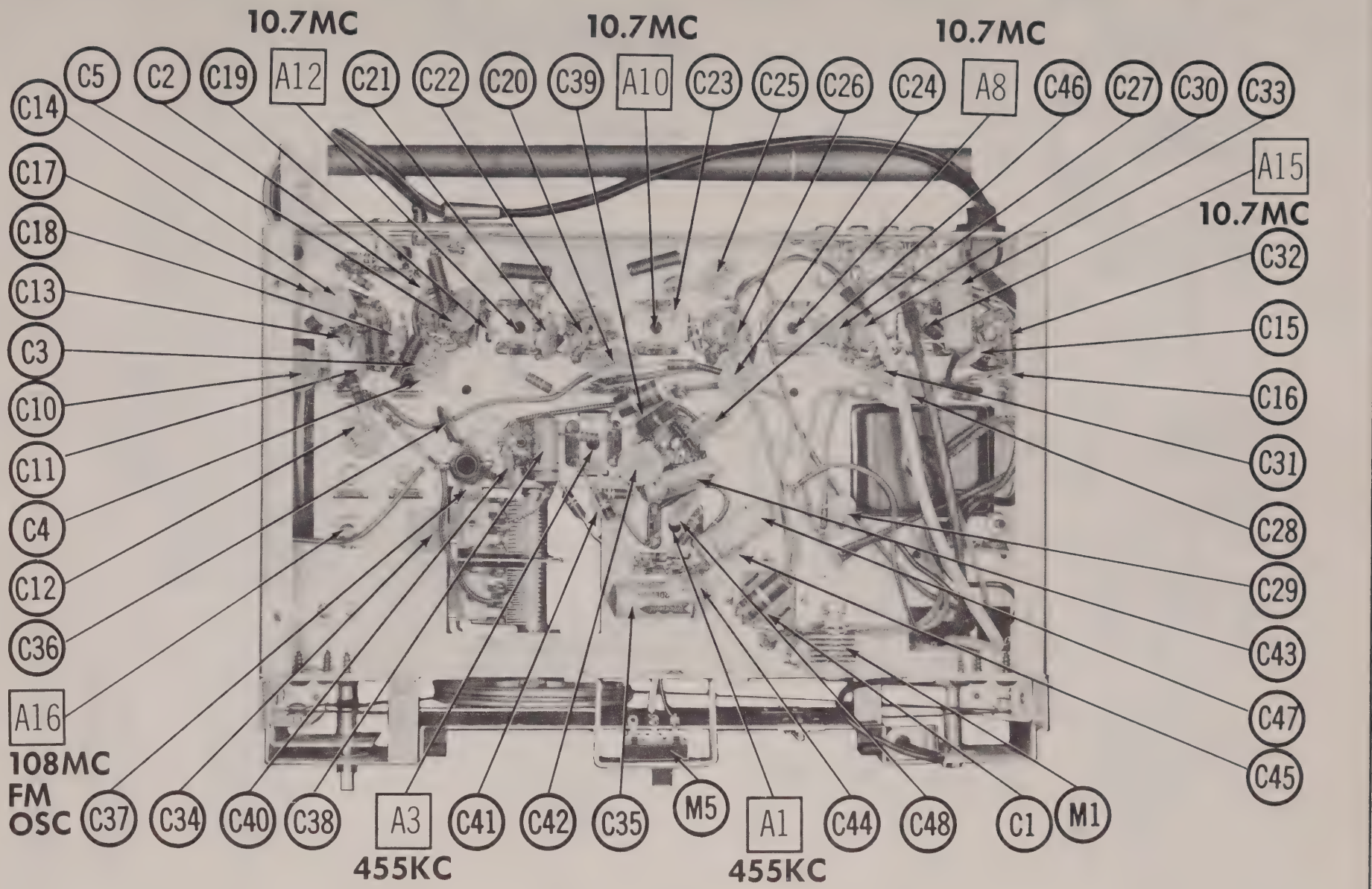
JL302

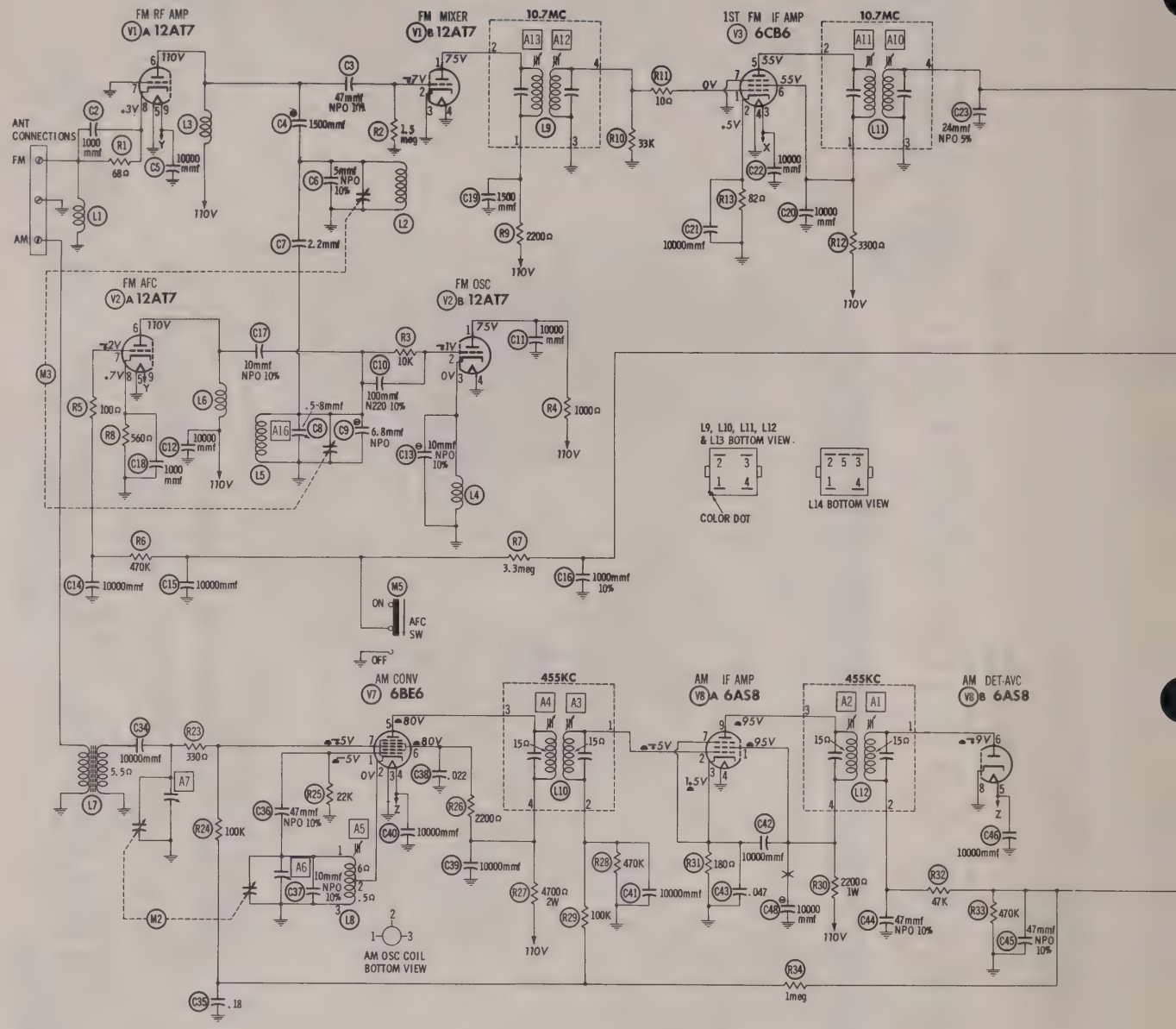
SET 461 FOLDER 10



CHASSIS BOTTOM VIEW - RESISTOR & INDUCTOR IDENT.



CHASSIS BOTTOM VIEW - CAPACITOR, ALIGNMENT, & MISC IDENT.



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AT7	†3500Ω	1.5meg	0Ω	0Ω	0Ω	†1300Ω	0Ω	68Ω	.1Ω
V2	12AT7	†2300Ω	10K	0Ω	0Ω	0Ω	†1300Ω	▪ 470K 4meg	560Ω	.1Ω
V3	6CB6	11Ω	82Ω	.1Ω	0Ω	†4600Ω	†4600Ω	0Ω		
V4	6CB6	.9Ω	47Ω	0Ω	.1Ω	†3500Ω *	†3500Ω	0Ω		
V5	6AU6	47K	0Ω	.1Ω	0Ω	†35K	†25K	0Ω		
V6	6AL5	0Ω	100K	.1Ω	0Ω	200K	0Ω	100K		
V7	6BE6	▲ 22K	▲ .5Ω	0Ω	.1Ω	▲ †6000Ω	▲ †8200Ω	▲ 500K		
V8	6AS8	▲ †3500Ω	▲ 350K	▲ 180Ω	0Ω	.1Ω	▲ 400K	▲ 180Ω	0Ω	▲ †3500Ω

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
† MEASURED FROM OUTPUT OF M1.
▲ MEASURED IN "AM" POSITION.
▪ MEASURED IN "FM-AFC" POSITION.

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. No signal applied for voltage measurements.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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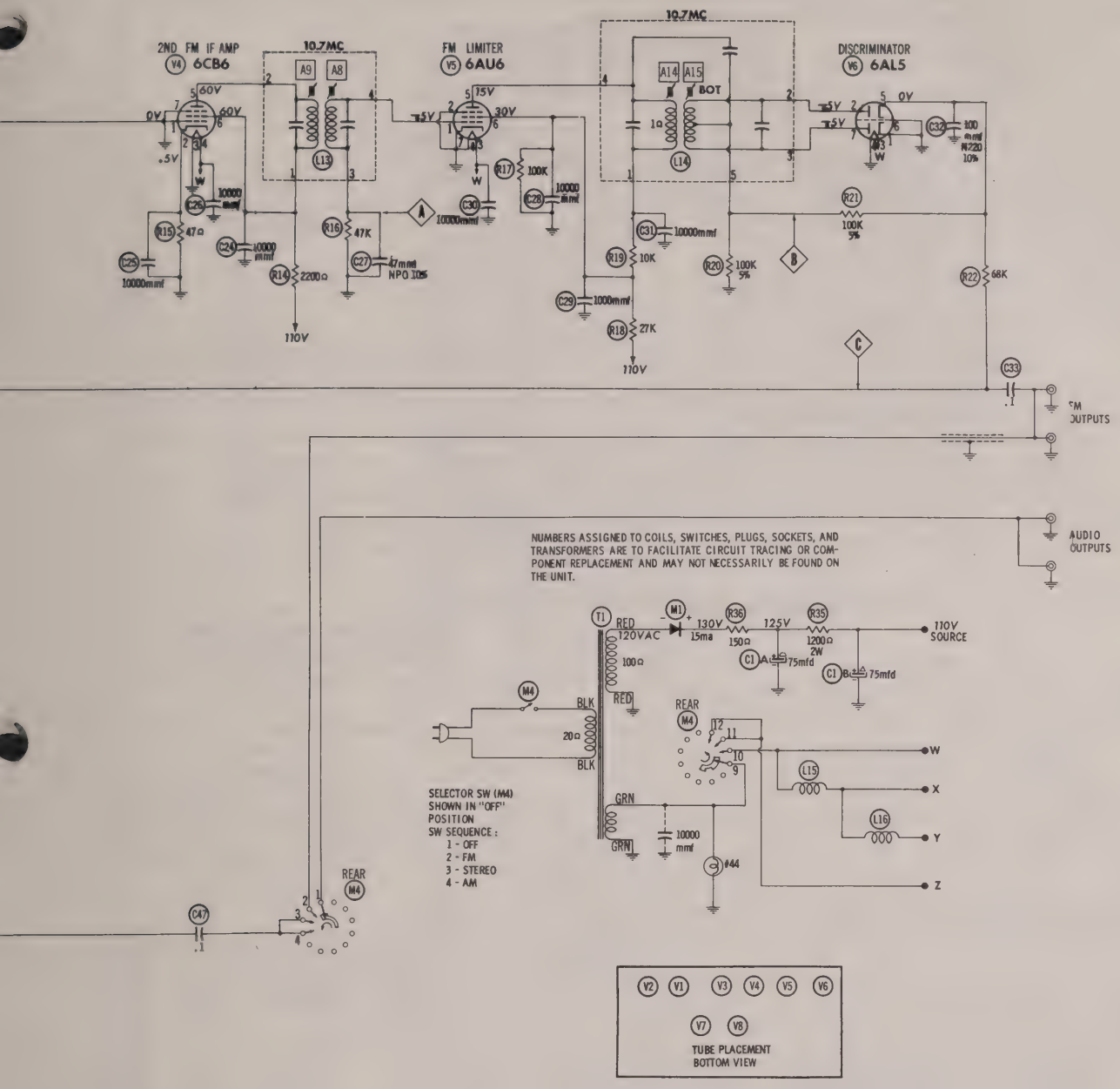


KNIGHT MODEL KN130 (92SU421)

KNIGHT MODEL KN130 (92SU421)

FOLDER 10

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Output of signal generator should be no higher than necessary to obtain an output reading.
Suggested Alignment Tools: A1 thru A5, A14, A15 ..... GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545
A6, A7, A16 ..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520
A8 thru A13 ..... GENERAL CEMENT #5097, 8727
WALSCO #2515

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.01mfd	High side to pin 7 (grid) of Converter. Low side to chassis.	455KC (400~ Mod.)	AM	AM Tuning gang fully open	AC probe to Audio Ouput Jack Common to chassis.	A1, A2, A3, A4	Adjust for maximum deflection.
2.	"	High side to AM antenna terminal. Low side to chassis.	600KC	"	600KC	"	A5	"
3.	"	"	1400KC	"	1400KC	"	A6, A7	Adjust for maximum deflection. Repeat steps 2 and 3 until no further improvement is noted.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.01mfd	High side to pin 2 (grid) of FM Mixer. Low side to chassis.	10.7MC (Unmod.)	FM (AFC off)	FM Point of non-interference	DC probe to point (A). Common to chassis.	A8, A9, A10, A11, A12, A13	Adjust for maximum deflection.
5.	"	"	"	"	"	DC probe thru 1meg to point (B). Common to chassis.	A14	"
6.	"	"	"	"	"	DC probe to point (C). Common to chassis.	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.01mfd	High side to pin 2 (grid) of FM Mixer. Low side to chassis.	10.7MC (450KC Swp)	FM (AFC off)	FM Tuning gang fully open	Vert. Amp. to point (A). Low side to chassis.	A8, A9, A10, A11, A12, A13	Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown.
5.	"	"	"	"	"	Vert. Amp. thru 27K to point (B). Low side to chassis.	A14	"
6.	"	"	"	"	"	Vert. Amp. to point (C). Low side to chassis.	A15	Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A14 for maximum amplitude and striaightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
7.	270Ω Carbon Resistor	High side thru 270Ω to FM antenna terminal. Low side to chassis.	88MC (Unmod.)	FM (AFC off)	88MC	DC probe to point (A). Common to chassis.	L5	Adjust for maximum deflection by compressing or expanding coil turns.
8.	"	"	108MC	"	108MC	"	A16	Adjust for maximum deflection.
9.	"	"	88MC	"	88MC	"	L2	Adjust for maximum deflection by compressing or expanding coil turns. Repeat steps 7, 8 and 9 until no further improvement is noted. Conclude with step 9.

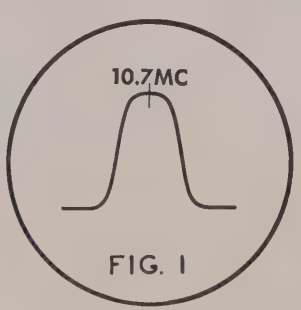


FIG. 1

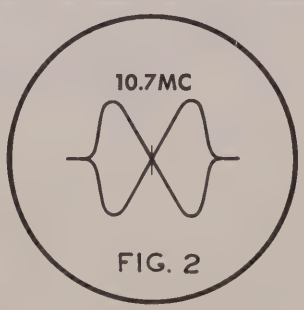


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	FM RF Amp. - FM Mixer	12AT7	V5	Limiter	6AU6
V2	FM Osc. - FM AFC	12AT7	V6	Discriminator	6AL5
V3	1st FM IF Amp.	6CB6	V7	AM Converter	6BE6
V4	2nd FM IF Amp.	6CB6	V8	AM IF Amp. - AM Det. - AVC	6AS8

ELECTROLYTIC CAPACITORS

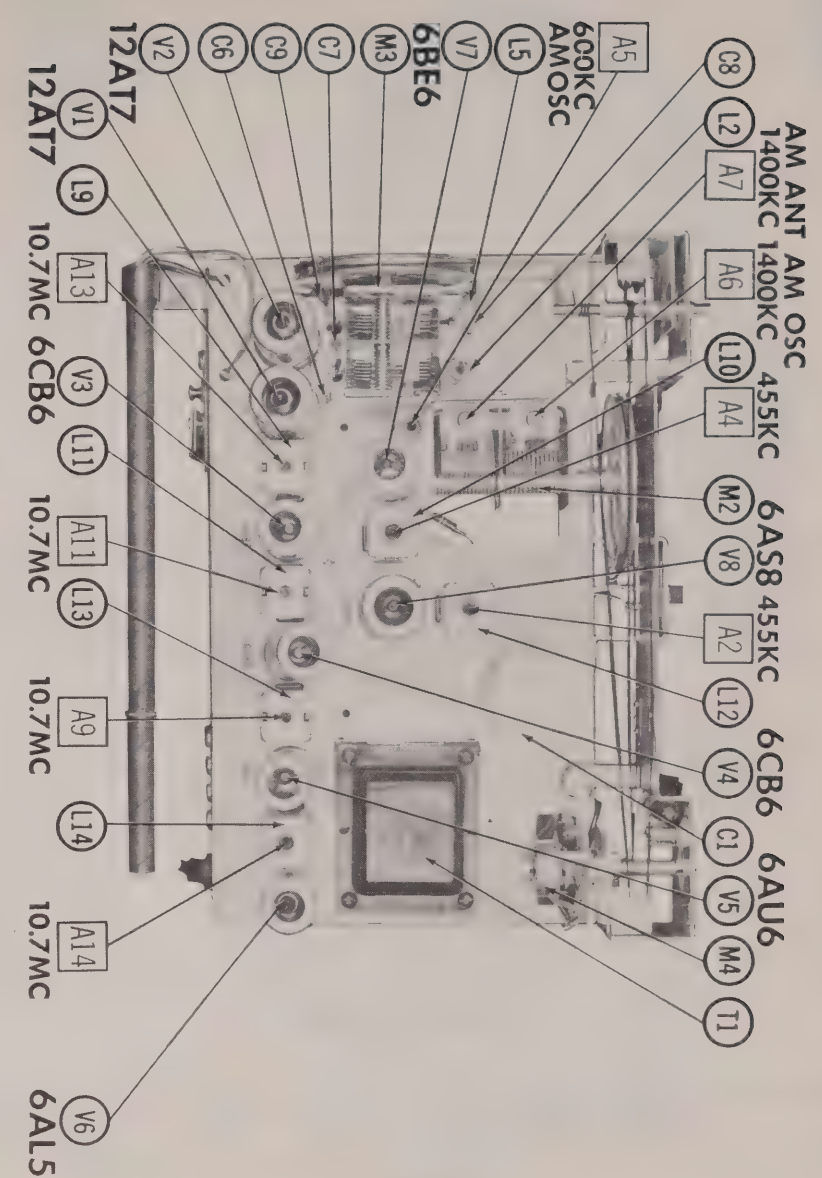
ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	KNIGHT PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲75	150		AFH2-20	XB0183	FP214.5	TMD-33	TVL-2442.4	
B	▲75	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING			REPLACEMENT DATA						NOTES
	CAP.	VOLT	TOL	KNIGHT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C3	47		NPO 10%		NPO-DI 47	DTZ-47	C10Q47C	CNO-447	5TCC-Q47S 10% *	
C4	1500				BPD-0015	DD-152	BYA10D15	B-215	5HK-D15	①
C5	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C6	5		NPO 10%		NPO-DI 5	DTZ-4R7	C10V5C	ZT-555	5TCCB-V5S 10% *	
C7	2.2				NPO-SI 2.2	TCZ-2R2	C10V22C	CNO-522	5TCCB-V22	
C8	.5-8									
C9	6.8		NPO		NPO-DI 6.8	DTZ-6R8	C10V68C	CNO-568	5TCCB-V68	②
C10	100		N220 10%							
C11	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C12	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C13	10		NPO 10%		NPO-DI 10	DTZ-10	C10Q1C	CNO-410	5TCC-Q1S 10% *	③
C14	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C15	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C16	1000		10%		DI-1000		PM6D1	JL-110	5GA-D1S 10% *	
C17	10		NPO 10%		NPO-DI 10	DTZ-10	C10Q1C	CNO-410	5TCC-Q1S 10% *	
C18	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C19	1500				BPD-0015	DD-152	BYA10D15	B-215	5HK-D15	
C20	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C21	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C22	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C23	24		NPO 5%			TCZ-24	C10Q24C		5TCC-Q24S 5% *	
C24	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C25	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C26	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C27	47		NPO 10%		NPO-DI 47	DTZ-47	C10Q47C	CNO-447	5TCC-Q47S 10% *	
C28	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C29	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C30	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C31	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C32	100		N220 10%							
C33	.1	200			P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C34	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C35	.18	200			P288N-2	DD-203	CUB2P22	GEM-2022	2TM-P22	
C36	47		NPO 10%		NPO-DI 47	DTZ-47	C10Q47C	CNO-447	5TCC-Q47S 10% *	
C37	10		NPO 10%		NPO-DI 10	DTZ-10	C10Q1C	CNO-410	5TCC-Q1S 10% *	
C38	.022	200			P288N-022		CUB4S22	GEM-4122	2TM-S22	
C39	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C40	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C41	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C42	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C43	.047	200			P288N-047	DF-503	CUB2S47	GEM-4147	2TM-S47	
C44	47		NPO 10%		NPO-DI 47	DTZ-47	C10Q47C	CNO-447	5TCC-Q47S 10% *	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	RATING TOL	REPLACEMENT DATA KNIGHT PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C45	47		NPO 10%		NPO-DI 47	DTZ-47	C10Q47C	CNO-447	5TCC-Q47S 10%*	
C46	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C47	.1	200			P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C48	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	④

① Some versions may use 1000mmf in this application.
② Some versions may use 10mmf NPO in this application.
③ Some versions may use 5mmf NPO 10% in this application.
④ Not used in some versions.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R1	68Ω	
R2	1.5meg	
R3	10K	
R4	1000Ω	
R5	100Ω	
R6	470K	
R7	3.3meg	
R8	560Ω	
R9	2200Ω	
R10	33K	
R11	10Ω	
R12	3300Ω	

ITEM No.	RATING	REMARKS
R13	82Ω	
R14	2200Ω	
R15	47Ω	
R16	47K	
R17	100K	
R18	27K	
R19	10K	
R20	100K 5%	
R21	100K 5%	
R22	68K	
R23	330Ω	
R24	100K	

ITEM No.	RATING	REMARKS
R25	22K	
R26	2200Ω	
R27	4700Ω 2W	
R28	470K	
R29	100K	
R30	2200Ω 1W	
R31	180Ω	
R32	47K	
R33	470K	
R34	1meg	
R35	1200Ω 2W	
R36	150Ω	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA KNIGHT PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	FM Antenna Coil		19-2006	19-2006	BC-560	4590		.68uh
L2	FM RF Coil							
L3	RF Choke							
L4	Cathode Choke		19-2006	19-2006	BC-560	4590		3.3uh
L5	FM Osc. Coil							.68uh
L6	RF Choke		19-2006	19-2006	BC-560	4590		.68uh
L7	Loopstick	LV-0017						
L8	AM Osc. Coil	LL-0059			BC-393 *	70-OSC *		
L9	1st FM IF Trans.	LR-0033	16-3487	16-3487	FM-254	1463		
L10	1st AM IF Trans.	LR-0041	16-6770	16-6770	BC-352	12-C1	RF-1	
L11	2nd FM IF Trans.	LR-0033	16-3487	16-3487	FM-254	1463		
L12	2nd AM IF Trans.	LR-0041	16-6770	16-6770	BC-353	12-C2	RF-2	
L13	3rd FM IF Trans.	LR-0033	16-3487	16-3487	FM-254	1463		
L14	Discriminator	LQ-0181	17-3494	17-3494	FM-253	1464		
L15	Fil. Choke		19-2006	19-2006	BC-560	4590		.68uh
L16	Fil. Choke		19-2006	19-2006	BC-560	4590		.68uh

* Disregard Primary Winding

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA KNIGHT PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V ② .30A	120V ② .030A	6.3V ② 2.5A	LP-0277						

RECTIFIERS

ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA KNIGHT PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	NOTES
M1	.014A	JR-0032 ①	1234AH ①	T065 ①	65A ①		① Selenium Type

MISCELLANEOUS

ITEM No.	PART NAME	KNIGHT PART No.	NOTES
M2	Tuning Cap.	CV-561	AM, 2 gang Ant. 12-432mmf, Osc. 8-152mmf
M3	Tuning Cap.	CV-370A	FM, 2 gang
M4	Switch	X-0367	Selector, Off-FM-Stereo-AM
M5	Switch		FM AFC-Off (SPDT Slide Type)

CABINETS & CABINET PARTS

When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting) .....Use BELDEN No. 8401
Phono Pick-up Arm Cable ..... Use BELDEN No. 8430 (Two Conductor - Twisted)

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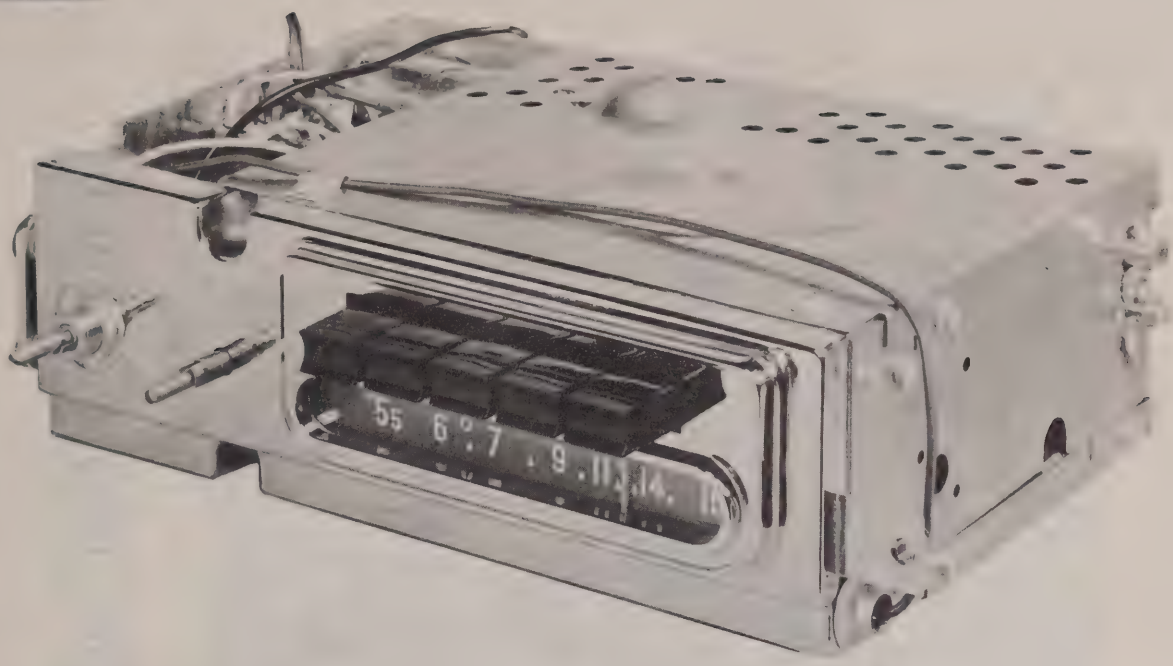
EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

MOPAR
MODEL 855

MOPAR
MODEL 855



TRADE NAME	Mopar Model 855 (P-5901) For 1959 Plymouth Automobiles
MANUFACTURER	Philco Corp., Tioga & "C" Streets, Philadelphia, Pa.
TYPE SET	Battery Operated 4 Tube Custom Built Automobile Receiver with Transistorized Output
POWER SUPPLY	12 Volt Storage Battery — RATING 2.1 Amp. @ 12.6 Volts DC
TUNING RANGE—BROADCAST	540-1605KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools:
A1, A2 .... GENERAL CEMENT #5097, 8727
WALSCO #2515
A3, A4 .... GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545
A5, A6 ... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05mfd	High side to pin 7 (grid) of Converter. Low side to chassis.	262.5KC (400∿Mod)	High Freq. end stop	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	Fig. 1	Thru dummy to antenna receptacle.	1605KC	"	"	A5, A6, A7	"

With radio installed in car and antenna fully extended, tune in a weak station near 1240KC and adjust A7 for maximum output.

PUSHBUTTON ADJUSTMENT

1. Pull button out.
2. Tune manually to desired station.
3. Press button in firmly.
4. Repeat for remaining buttons.

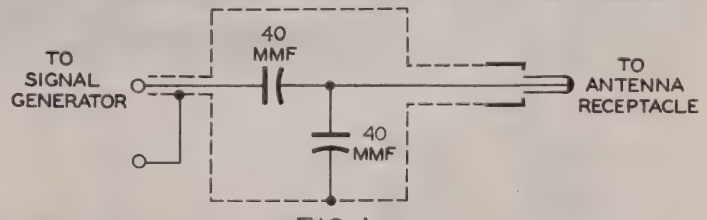


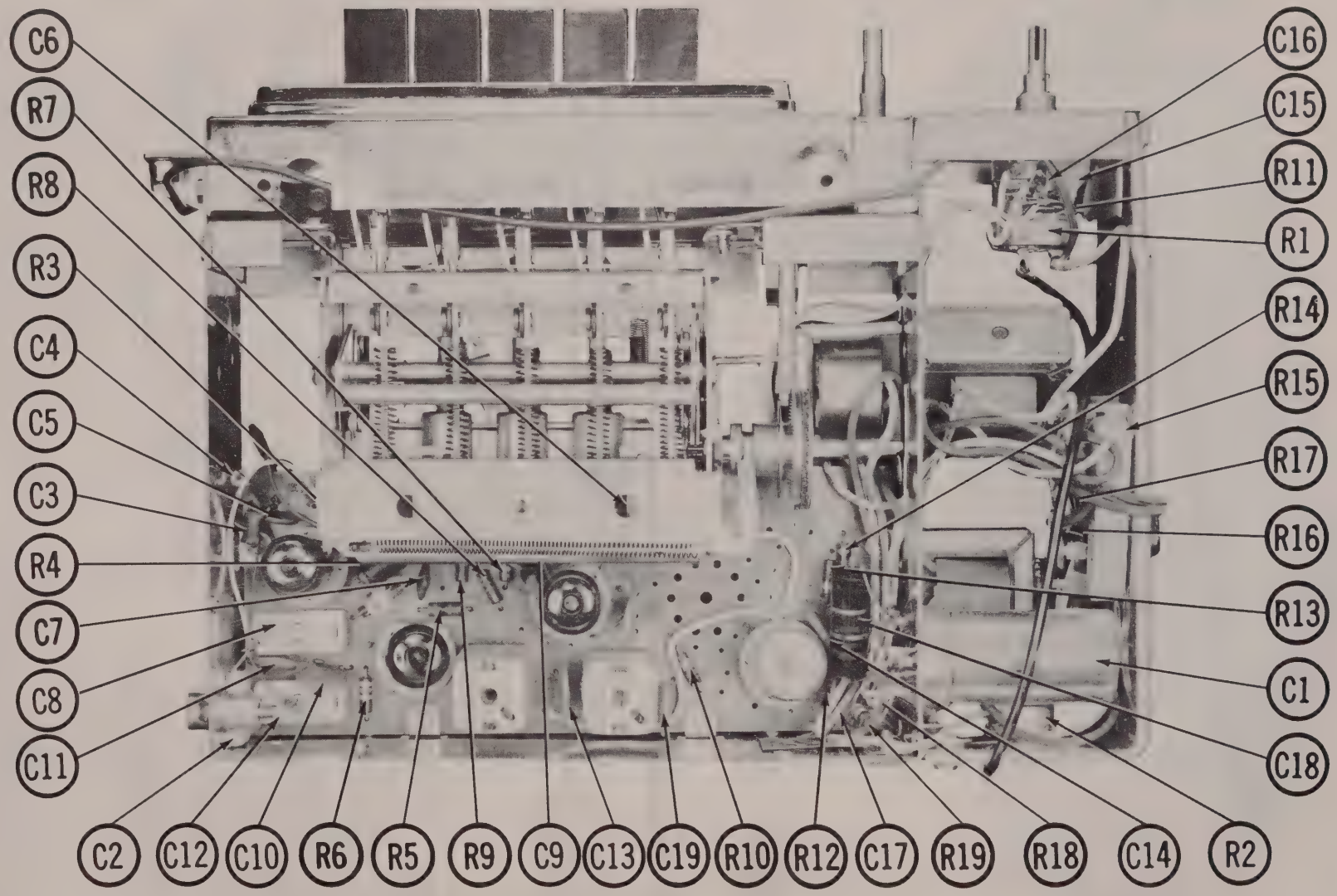
FIG. 1

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1959 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

JD225

SET 461 FOLDER 11



CHASSIS TOP VIEW - CAPACITOR & RESISTOR IDENT

PARTS LIST AND DESCRIPTIONS

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Shielded Hook-up Wire	Use BELDEN No. 8885
Bonding Strap	Use BELDEN No. 8661

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	RF Amplifier	12BL6	
V2	Converter	12AD6	
V3	IF Amplifier	12CX6	
V4	Det.-AVC-Driver	12DU7	

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	AR12	Output					PNP

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	■800	16	16-0086-11	AFH2-02-55					
B	▲200	16							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING			REPLACEMENT DATA						NOTES
	CAP.	VOLT	TOL	PHILCO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2				31-6533-1						
C3	7.5			20-1224-132		DD-7R5	L10V7		5GA-V75	
C4	82			62-08240911	SI 82	DD-820	L10Q82	CNO-482	5GA-Q82	
C5	15			30-1263-25	BPD-000015	DD-150	L10Q15	CNO-415	5GA-Q15	
C6	.22	200		30-4695-32	P288N-22		CUB2P22	GEM-2022	2TM-P22	
C7	10			30-1263-11	BPD-00001	DD-100	L10Q1	CNO-410	5GA-Q1	①
C8				31-6532-3						
C9	10000			30-1262	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C10	100			30-1263-9	BPD-0001	DD-101	L10T1	B-310	5GA-T1	
C11	100		N750	30-1263-14	N750-DI 100	DTN-100	C10T1U	CN7-310	5TCU-T1	
C12				31-6532-4						
C13	10000			30-1262	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C14	3300			30-1262-5	BPD-0033	DD-332	BYA10D33	B-233	5HK-D33	
C15	5000			30-1238-20	BPD-005	DD-502	BYA10D5	B-250	5HK-D5	
C16	68			30-1251-28	BPD-000068	DD-680	L10Q68	CNO-468	5GA-Q68	②
C17	8200			30-1262-1				B-282		
C18	.1	200		30-4650-47	P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C19	100			30-1263-9	BPD-0001	DD-101	L10T1	CNO-310	5GA-T1	

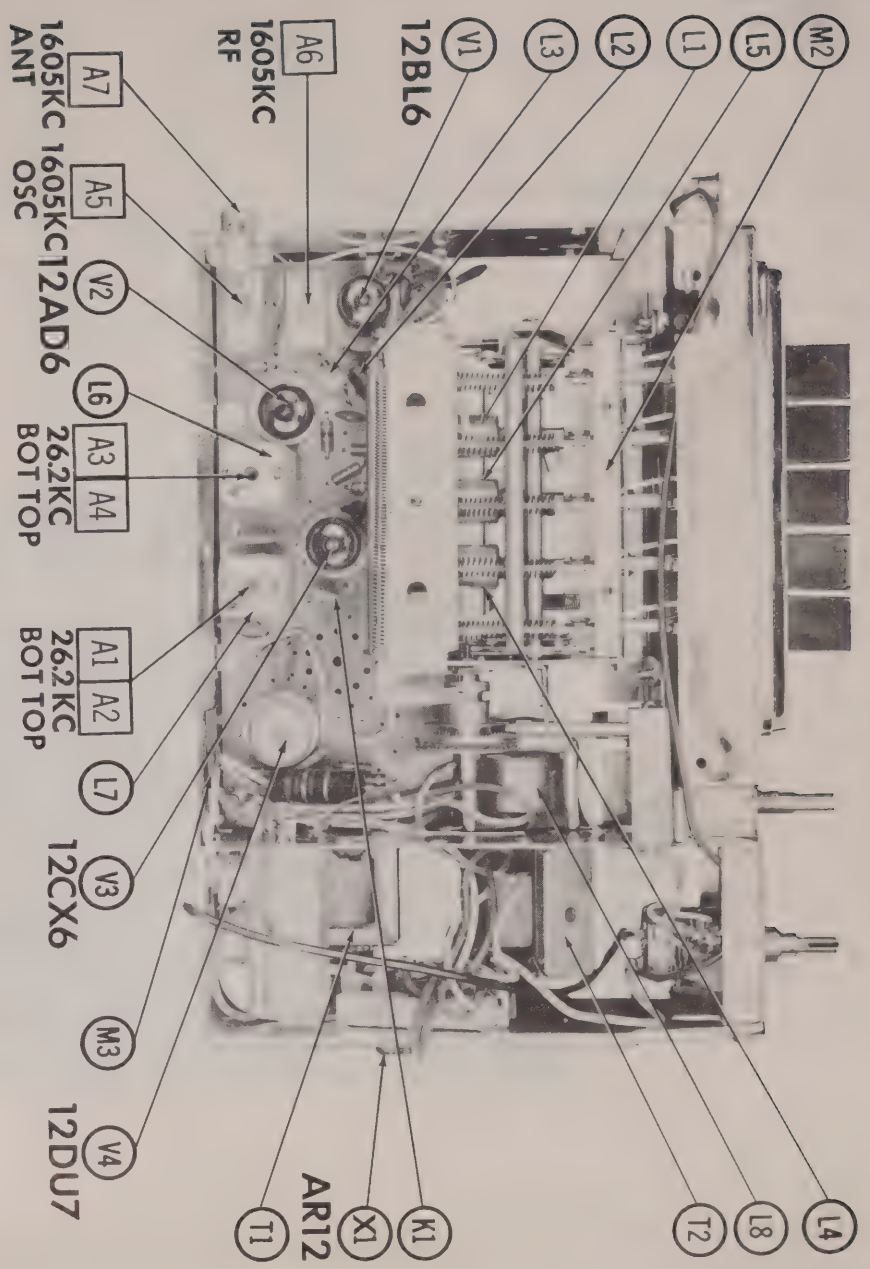
① Some versions may use 5mmf in this application.
② Some versions may use 82mmf in this application.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	PHILCO PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1meg	½	33-5580-27	F1-54		† QJ1107A		Tone
B	1meg	½		R2-59				Volume, Tap ⓐ 350K
C	Bushing			AK-28				
D	Switch			KB-4				Power Off-On
R2	15Ω	1(WW)	33-5591-2				FL-15	Bias

† "Concentrikit" Equivalent: K-8 Kit with Base Elements & Shafts: B13-137, P14-024 (Panel)
B13-137X, R9-110 (Rear)
S-11 (Bushing) 76-1 (Switch)

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	PHILCO PART No.	NOTES
R3	150K		66-4158340	
R4	1200Ω		66-2128340	
R5	1meg		66-5108340	
R6	47K		66-3478340	
R7	6.8meg		66-5688340	
R8	22meg		66-6228340	
R9	10meg		66-6108340	
R10	1.2meg		66-5128340	
R11	100K		66-4108340	
R12	10meg		66-6108340	
R13	10Ω		66-0108340	
R14	10Ω		66-0108340	Note 1 Note 2
R15	100Ω	10		
R16	18Ω		66-0188340	
R17	.27Ω		66-8273360	
R18	120Ω		66-1128340	
R19	39Ω		66-0398340	

① Not used in some versions. ② Temperature Compensating.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	PHILCO PART No.	REPLACEMENT DATA
K1	Diode RF Filter	100mmf, 47K	30-6036-2	Sprague D-7

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA PHILCO PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Ant. Coil	†						
L2	RF Choke	32-4480-29						1.2mh
L3	RF Choke	32-4480-35	19-4160	19-4160	TV-196	6120	VP-5	165uh
L4	RF Coil	†						
L5	Osc. Coil	†						
L6	Input IF	32-4773-2	16-6756	16-6756	BC-344	13-PH1		
L7	Output IF	32-4774-1						

† Part of M2 Part #76-11349-3 (A) or Part #76-11349-4 (B).
L1 Part #32-4730-7 with (A) Assy.
L1 Part #32-4730-16 with (B) Assy.
L4 Part #32-4730-8 with (A) Assy.
L4 Part #32-4730-17 with (B) Assy.
L5 Part #32-4730-9 with (A) Assy.
L5 Part #32-4730-18 with (B) Assy.

FILTER CHOKE

ITEM No.	RATINGS CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA PHILCO PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L8	1.9A	.5Ω	.008 Hy.	32-8879-2						

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO PRI.	TURNS RATIO SEC.	REPLACEMENT DATA PHILCO PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T1	12	1	32-8875-1						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA PHILCO PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	16Ω	3-4Ω	32-8859-1							

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	REPLACEMENT DATA PHILCO PART No.	QUAM PART No.	NOTES
SP1	5" x 7"	PM	3-4Ω	36-1670-2	57A15	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA PHILCO PART No. FUSE	PHILCO PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	SFE	7.5A 32V	45-2656-53		30307.5 (7.5A 32V)	155009	SFE7½	HDH

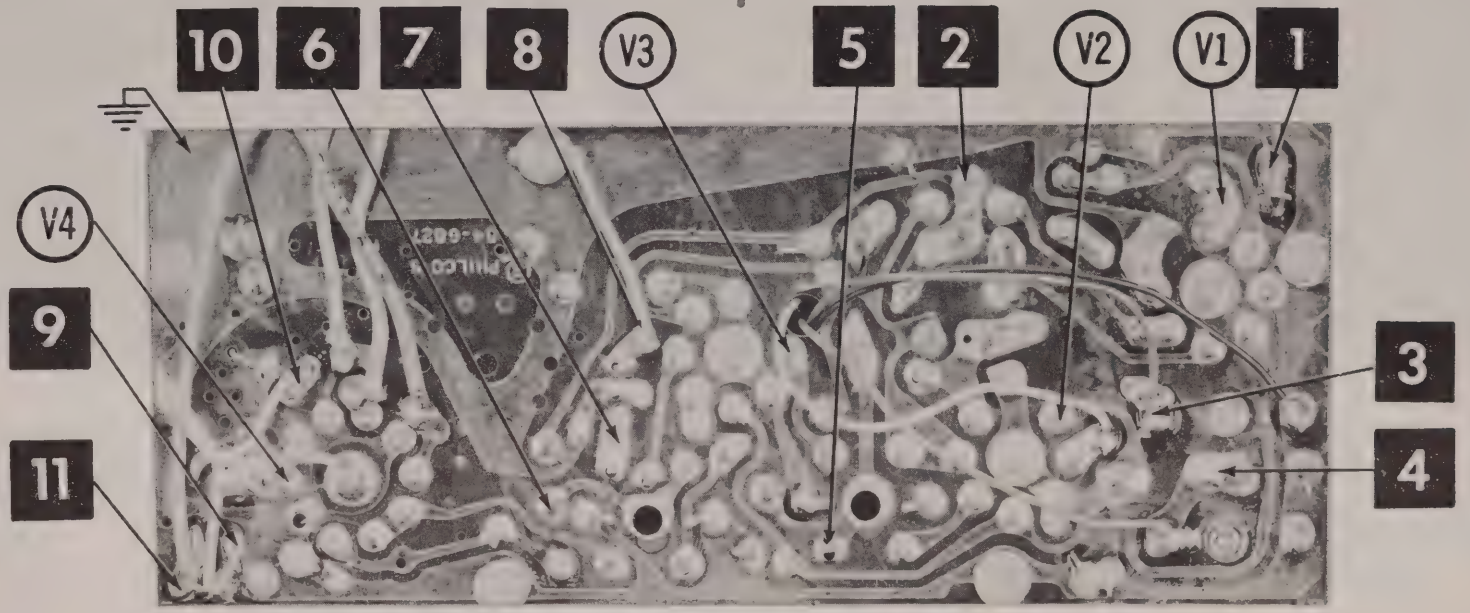
MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M2	Tuner	76-11349-3	
	Tuner	76-11349-4	
M3	Spark Plate	30-1254-1	300mmf
	Printed Board	54-6827	

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Bezel	28-12510-1	
Knob Assy.	27-4687-2	Volume, Tuning
Pushbutton	54-6351-1	Station Selector
Dial	28-12511	
Pointer Arm Assy.	76-11513-5	Tuner Assy. 76-11349-3
Pointer Arm Assy.	76-11513-6	Tuner Assy. 76-11349-4



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PRINTED BOARD

MODEL 855

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED

1. DC voltage measurements taken with vacuum tube-voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 12.6 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±5% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9	
V1	12BL6	8.7meg	8.6meg	0Ω	1.5Ω	†75Ω	†39Ω	0Ω			
V2	12AD6	47K	1Ω	0Ω	1.5Ω	†110Ω	†39Ω	1meg			
V3	12CX6	5meg	0Ω	1.5Ω	0Ω	†60Ω	†39Ω	0Ω			
V4	12DU7	10meg	10Ω	†39Ω	1.5Ω	0Ω	†210Ω	1meg	TP	10meg	

TRANSISTOR CIRCUIT RESISTANCE NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.
† MEASURED FROM JUNCTION OF C1A AND R19. TP TIE POINT.

SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE

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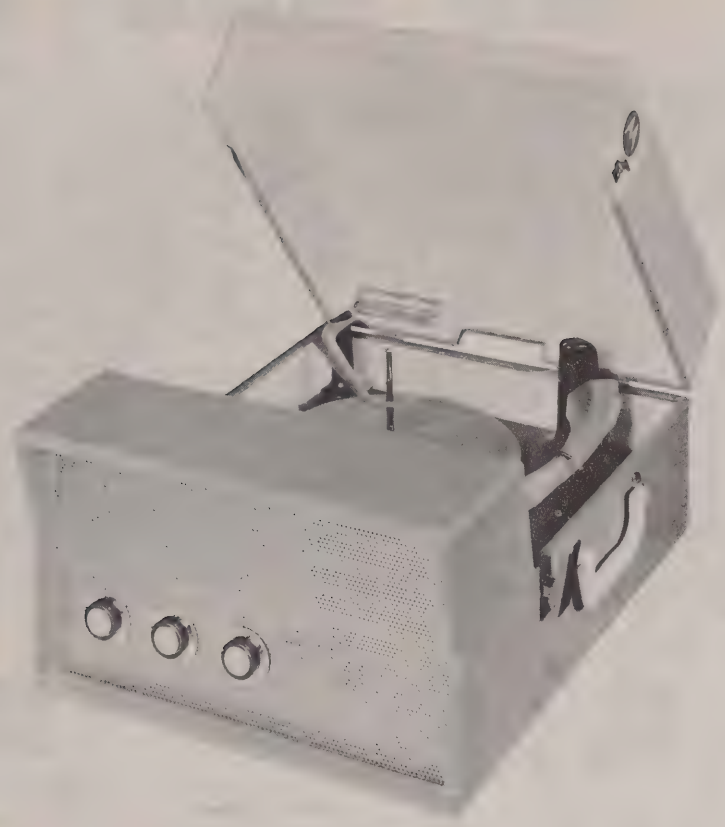
MOPAR MODEL 855

PHOTOFACT* Folder with CIRCUITRACE*

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

MOTOROLA MODEL 5R14N (Ch. HS-670)

MOTOROLA MODEL 5R14N (Ch. HS-670)



MOTOROLA MODEL 5R14N (Ch. HS-670)

TRADE NAME	Motorola Model 5R14N (Ch. HS-670)
MANUFACTURER	Motorola Inc., 4545 W Augusta Blvd., Chicago 51, Illinois
TYPE SET	AC Operated 5 Tube AM Receiver With 4 Speed Automatic Record Changer
POWER SUPPLY	110-120 Volts AC, 60 Cycles
RATING	28 Watts, .26 Amp. @ 117 Volts AC (Less Motor)
TUNING RANGE—BROADCAST	535 - 1620KC

FOR SERVICE INFORMATION ON RECORD CHANGER - SEE SIMILAR MONARCH UA8 - PHOTOFACT SET 381 FOLDER 11

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: A1, A2, A3, A4 ..... GENERAL CEMENT #8606, 8606L, 8282, 9295 WALSCO #2526, 2543, 2544, 2545

A5, A6 ..... GENERAL CEMENT #5004, 5008, 5009 WALSCO #2520

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to pin 7 (grid) of Converter. Low side to chassis.	455KC (400~ Mod.)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	"	"	A6	Reinstall receiver in cabinet. Adjust for maximum output.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of JP241

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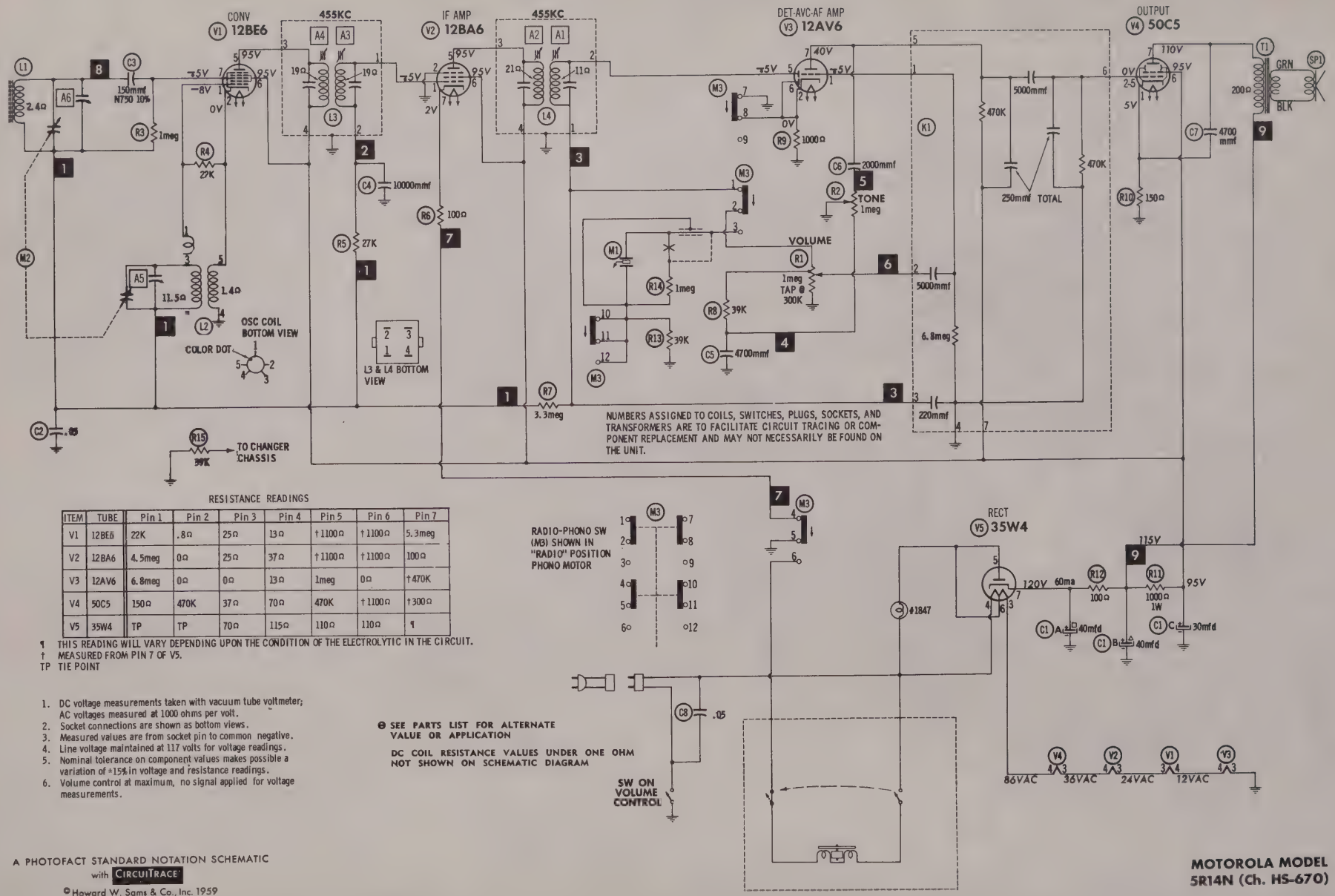

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12BE6	22K	.8Ω	25Ω	13Ω	†1100Ω	†1100Ω	5.3meg
V2	12BA6	4.5meg	0Ω	25Ω	37Ω	†1100Ω	†1100Ω	100Ω
V3	12AV6	6.8meg	0Ω	0Ω	13Ω	1meg	0Ω	†470K
V4	50C5	150Ω	470K	37Ω	70Ω	470K	†1100Ω	†300Ω
V5	35W4	TP	TP	70Ω	115Ω	110Ω	110Ω	¶

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 7 OF V5.
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE®

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MOTOROLA MODEL 5R14N (Ch. HS-670)

PARTS LIST AND DESCRIPTIONS

TUBES

• CBS •	GENERAL ELECTRIC •	RAYTHEON •	SYLVANIA •

ITEM No.	USE	TYPE
V1	Converter	12BE6
V2	IF Amplifier	12BA6
V3	Det. - AVC - AF Amp.	12AV6
V4	Output	50C5
V5	Rectifier	35W4

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	■40	150	23B639496	AFH3-11-30	C0090 ‡	PFP311 63		PCLS-3439.1*	
B	▲40	150							
C	30	150							

‡ Use Printed Circuit Adaptors #55277 & 55278.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	RATING TOL	REPLACEMENT DATA MOTOROLA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	.05	400		8K121268	P4151N-047	DF-503	BC6S47J	ACE615	4SE-S47	
C3	150		N750 10%	21K127652	N750-DI 150	DTN-150	C10T15U	CN7-315	5TCU-T15S 10%*	
C4	10000			21B533471	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C5	4700			21K129106	BPD-0047	DD-471	BYA10D47M	B-247	5HK-D47	
C6	2000			21K129105	BPD-002	DD-102	BYA10D2	B-210	5HK-D2	
C7	4700			21K129106	BPD-0047	DD-471	BYA10D47M	B-247	5HK-D47	
C8	.05	400		8K128690	P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1meg	½	18B642040					Volume, Tap @ 300K
B	Switch							Off-On
R2	1meg	½	18B642128					Tone

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R3	1meg	
R4	22K	
R5	27K	
R6	100Ω	
R7	3.3meg	
R8	39K	
R9	1000Ω	
R10	150Ω	
R11	1000Ω 1W	
R12	100Ω	
R13	39K	
R14	1meg	
R15	39K	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	MOTOROLA PART No.	REPLACEMENT DATA
K1	Audio Coupling	220mmf, 250mmf, 5000mmf, 5000mmf, 470K, 470K, 6.8meg	51B635833	Aerovox PA-512-3 Centralab PC-158 Sprague DT-5

PRINTED BOARD

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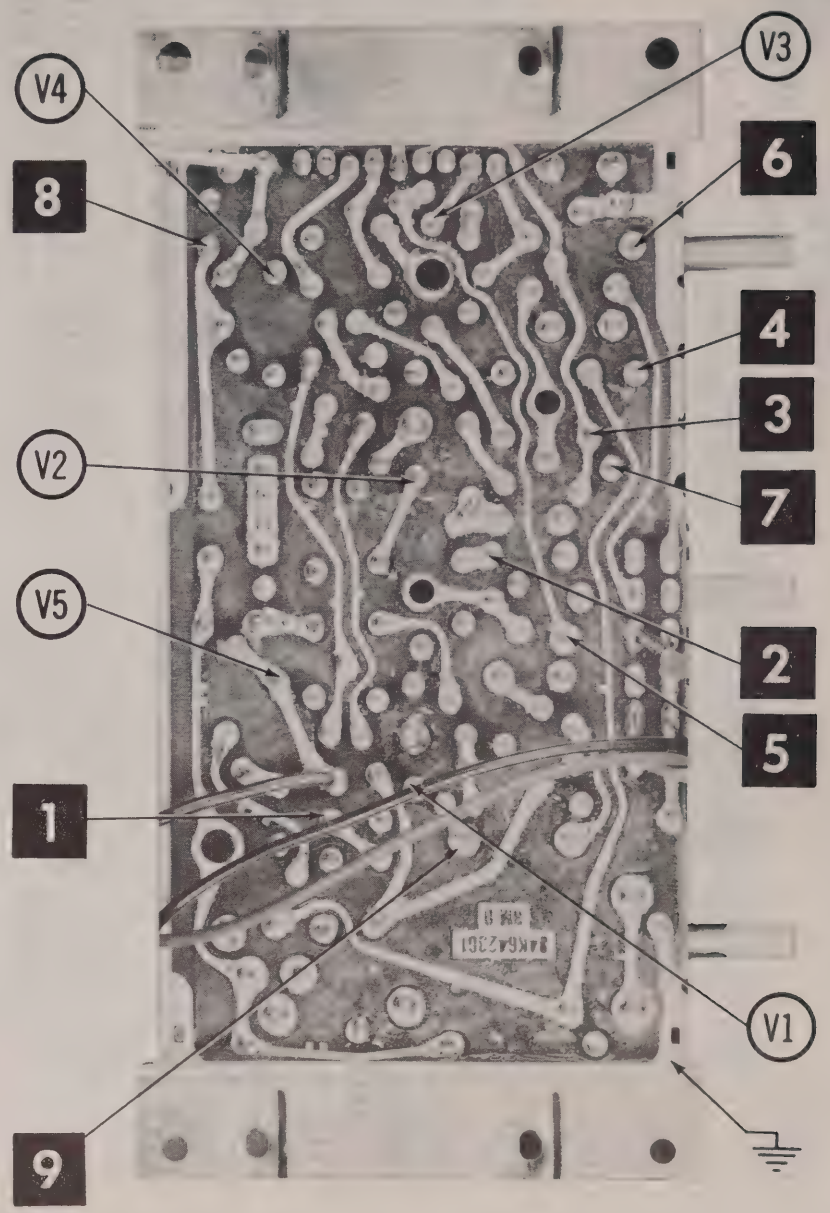
ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		MOTOROLA PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loop Antenna	1V642283						
L2	Osc. Coil	24K636206						
L3	Input IF	24K636016	16-6780	16-6780	BC-356	13-PC9	RF-4	
L4	Output IF	24K638563	16-6780	16-6780	BC-357	13-PC10	RF-4	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2700Ω	3-4Ω	25C642355	22S46 ①	A-2928 ①	AU-603 ①	A-3876 ①	22S46 ①	S-1X ①	① Use original channel frame.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	QUAM PART No.	
SP1	5"	PM	3-4Ω	50K641623	5A07	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA						REMARKS
	MOTOROLA PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		JENSEN PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1		93-T	Not Req.	EV56 *	Not Req.			* Use Mount PT-2

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M2	Tuning Cap.	19C642159	2 Gang
M3	Switch	40B642158	Radio-Phono, 3PDT (Slide Type)
	Printed Board	84K642361	(Less All Components)

CABINETS & CABINET PARTS

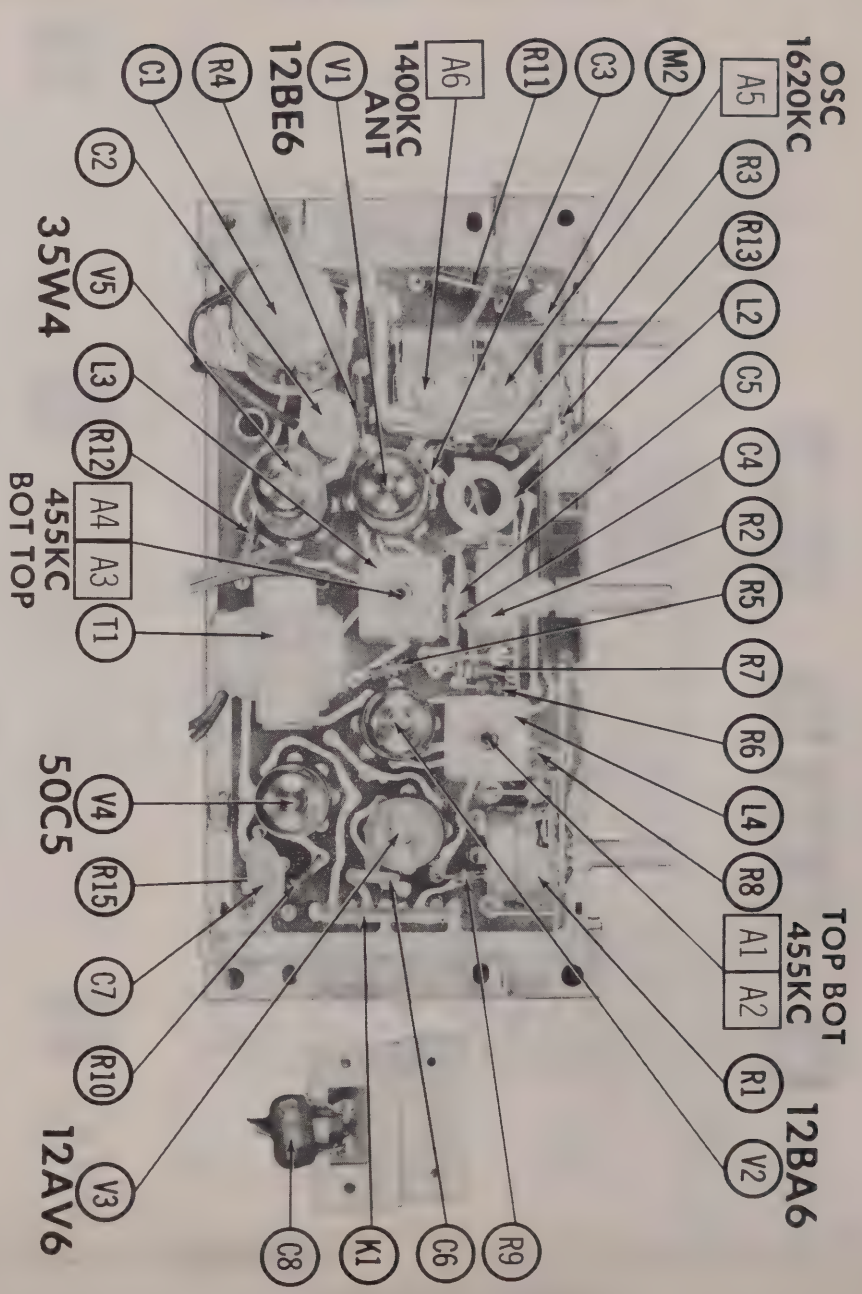
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	36C642191	Tuning
Knob	36K642192	Volume-Off-On
Knob	36K642193	Tone-Phono-Radio
Cabinet	1V642293	
Handle	55K641852	

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

CHASSIS—TOP VIEW



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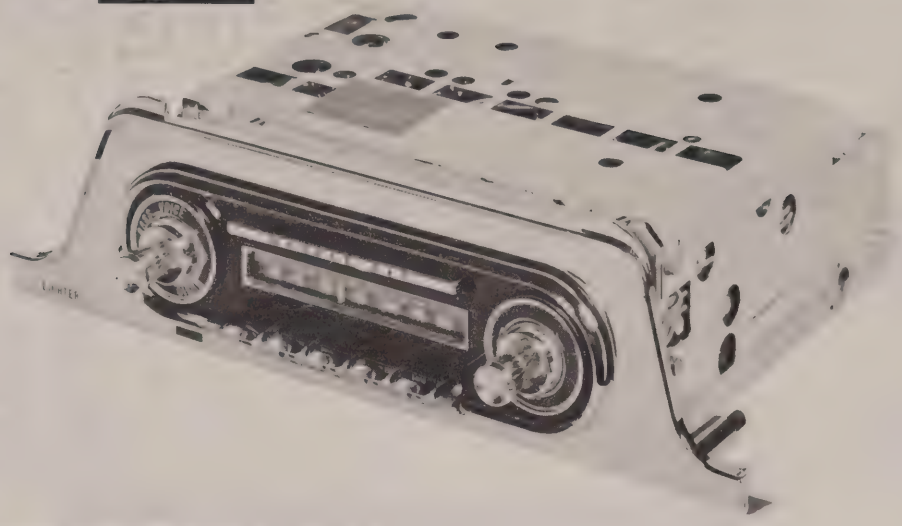
EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

OLDSMOBILE MODEL 989171



TRADE NAME	Oldsmobile Model 989171 (For 1959 Oldsmobile Automobiles)
MANUFACTURER	Delco Radio Div., G. M. Corp., Kokomo, Indiana
TYPE SET	Battery Operated 5 Tube Custom Built AM Automobile Receiver With Transistorized Output
POWER SUPPLY	12 Volt Storage Battery — RATING 2.2Amp. @12.6 Volts DC
TUNING RANGE—BROADCAST	540 — 1615KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

* To tune to high frequency stop, put .070" feeler gauge against the high frequency stop. Tune manual control to allow treadle bar arm to run against feeler gauge.

Suggested alignment tools:
A1 thru A4.....GENERAL CEMENT #8282, 8606, 8606L, 9091
WALSCO #2526, 2541, 2543, 2544
A6, A7, A8.....GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520
A5, A9, A10.....GENERAL CEMENT #8607, 9291
WALSCO #2520, 2522, 2523, 2524, 2537

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.1mfd	High side to pin 7 (grid) of Converter. Low side to chassis.	262.5KC (400~ Mod.)	High freq. end stop. (See Note *)	DC probe to point (A). Common to chassis.	A1, A2, A3	Adjust for maximum deflection.
2.	"	"	"	"	"	A4	Adjust for MINIMUM deflection.
	Check setting of oscillator core (A5). Rear of core should be 1 5/8" from mounting end of coil form.						
3.	68mmf	High side to antenna receptacle. Low side to chassis.	1615KC	"	"	A6, A7, A8	Adjust for maximum deflection.
4.	"	"	600KC	Tune to 600KC Signal	"	A9, A10	Adjust for maximum deflection.
5.	"	"	1615KC	Tune to 1615KC Signal	"	A7, A8	"
	With radio tuned to an 1100KC signal, adjust pointer adjustment so that pointer coincides with 1100KC mark on dial.						
6.	With radio installed in car and antenna fully extended, tune in a weak station near 1000KC and adjust A8 for maximum output.						

PUSHBUTTON ADJUSTMENT

1. Pull pushbutton to the left and out.
2. Tune manually to desired station.
3. Press pushbutton in firmly.
4. Repeat for remaining pushbuttons.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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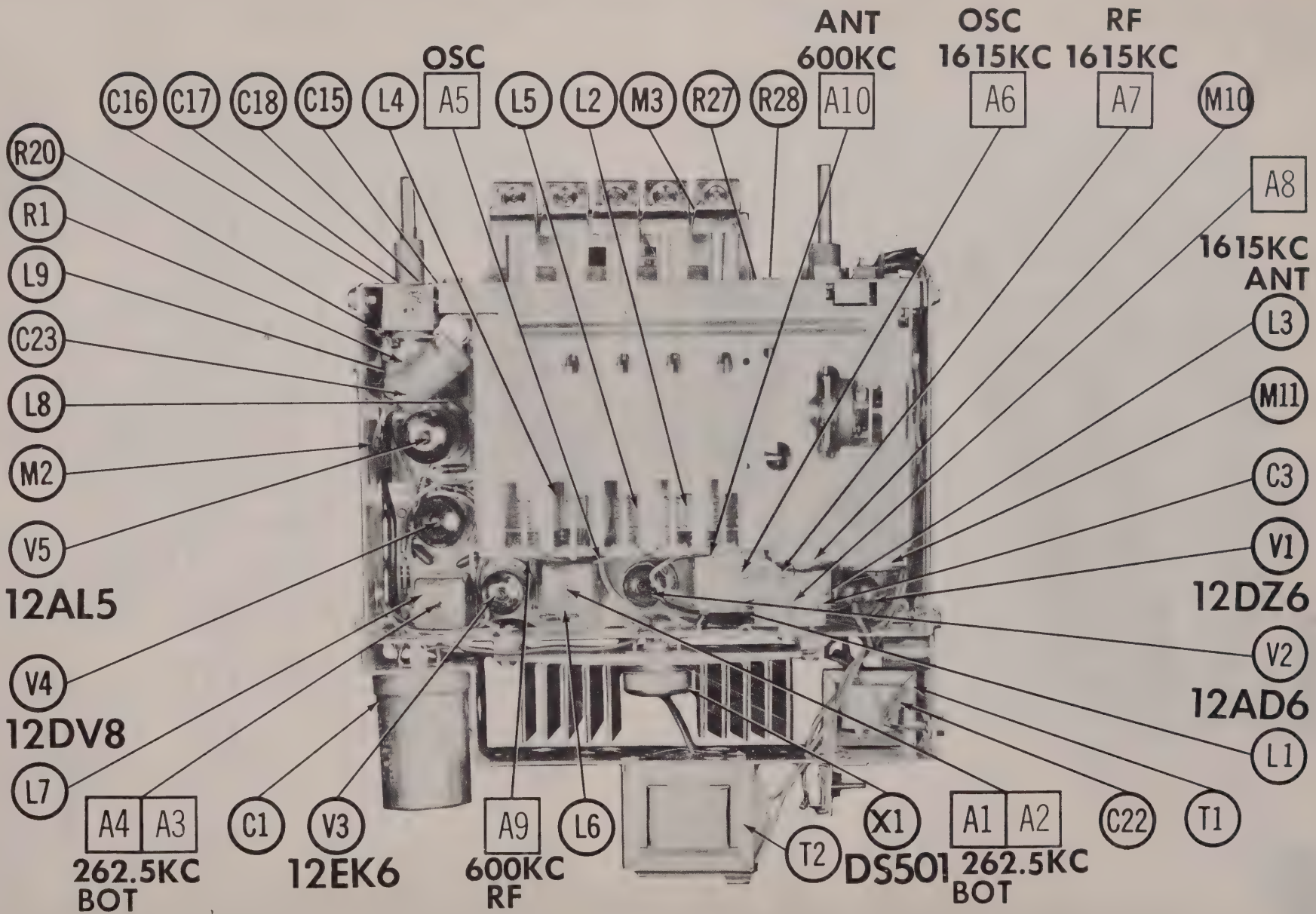
JD434

OLDSMOBILE MODEL 989171
OLDSMOBILE MODEL 989171
SET 461 FOLDER 13



CHASSIS TOP VIEW

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆		GENERAL ELECTRIC ◆		RAYTHEON ◆		SYLVANIA ◆	
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	RF Amplifier	12DZ6	V4	Det. AVC-Driver	12DV8
V2	Converter	12AD6	V5	Trigger	12AL8
V3	IF Amplifier	12EK6			

TRANSISTORS

ITEM No.	ORIG. TYPE *	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	DS501	Output				2N677	PNP

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	DELCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	750	16	7273728	AFH420-75		WP401.5		TVLS-4204 *	Note 1
B	600	16							
C	350	16							
D	4	16							
C2	1000	1	7271557	PRS6V1000	BBR1000-6	TC110	TD-1000-6	TVA-1104	

Note 1. Some versions may use 600-750-350-4mfd@16-16-16-32V (Part #7273847).
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING			REPLACEMENT DATA						NOTES
	CAP.	VOLT	TOL	DELCO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C3				7266240						
C4	.047	200		7271670	P288N-047	DF-503	CUB2S47	GTM-2147	2TM-S47	
C5	68			6369	BPD-000068	DD-680	L10Q68	CNO-468	5GA-Q68	
C6A				7273693						
B										
C7	.1	200		6690	P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C8	220		5%	7273511	ADM-15-221 5%	DTZ-220	22R5T22		MS-322	
C9	39		N470 10%	6366						
C10	2000			6352	BPD-002	DD-202	BYA10D2	B-220	5HK-D2	
C11	.1	200		6690	P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C12	100		5%	1219498	ADM-15-101 5%	DTZ-100	22R5T1	MCE-235	MS-31	
C13	.1	200		6690	P288N-1	DF-104	CUB2P1	GEM-201	2TM-P1	
C14	47		10%	6367	ADM-15-470 5%	DTZ-47	22R5Q47	CNO-447	MS-447	
C15	.01	400		6610	P488N-01	DD-103	CUB4S1	GEM-411	4TM-S1	
C16	330			6377	BPD-00033	DD-331	L10T33	B-333	5GA-T33	
C17	47			7273896	BPD-000047	DD-470	L10Q47	CNO-447	5GA-Q47	
C18	1000			6350	BPD-001	DD-102	BYA10D1	B-210	5HK-D1	
C19	100		5%	1219498	ADM-15-101 5%	DTZ-100	22R5T1	MCE-235	MS-31	
C20	100		N750 10%	6371	N750-D1 100	DTN-100	C10T1U	CN7-310	5TCU-T1S 10%*	
C21	.047	100		7272519	P288N-047	DF-503	CUB2S47	GTM-2147	2TM-S47	
C22	4700				BPD-0047	DD-472	BYA10D47M	B-247	5HK-D47	①
C23	.47	100		6692	P288N-47		CUB2P47	GEM-2047	2TM-P47	

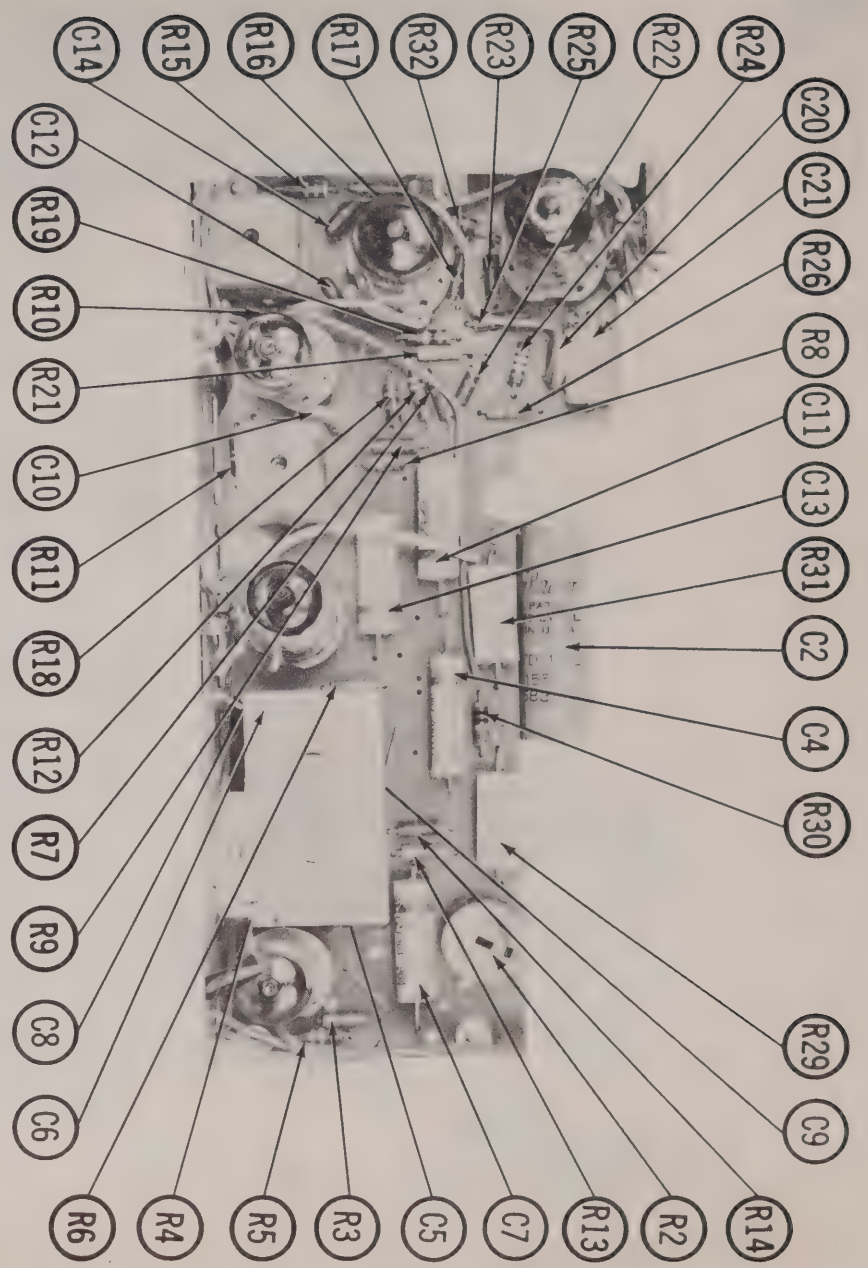
① Some versions may use .01mfd@200V in this application (Part #6610).
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	DELCO PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	5meg *		7272855					Tone
B	5meg						▲ UE3993-S	Volume, Tap@2 meg
C	Switch							Power On-Off
R2	110Ω	1(WW)	7273776			110-100	PFL-100	Bias

* Open in center, 2.5meg each side.
▲ "STA-LOC" equivalent: FI56X, RU56T26, OS1062, IS1812, US-41.

PRINTED BOARD



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R3	2.2meg	
R4	10K	
R5	150K	
R6	47K	
R7	3.3meg	
R8	680K	
R9	1.5meg	
R10	3300Ω 5%	
R11	150Ω	
R12	3.3meg	

ITEM No.	RATING	REMARKS
R13	1.5meg	
R14	1.5meg	
R15	47K	
R16	680K	
R17	15Ω	
R18	56Ω	
R19	18Ω	
R20	1meg	
R21	4.7meg5%	
R22	3.9meg	

ITEM No.	RATING	REMARKS
R23	1meg	
R24	680K	
R25	27Ω 5%	
R26	2.2meg	
R27	33K	
R28	1800Ω	
R29	100Ω 5W	
R30	10Ω	
R31	.47Ω Cold2W	#7270608
R32	560Ω 5%	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		DELCO PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Ant. Coil	7255738	19-1004	19-1004	BC-565	4610		
L2	Ant. Tuning Coil	1221138						
L3	RF Choke	7269684						
L4	RF Tuning Coil	1221138						
L5	Osc. Tuning Coil	1221151						
L6	Input IF	1221257	16-6756	16-6756	BC-344	13-PH1		
L7	Output IF	1221253						
L8	"A" Lead Choke	1217846						1.4uh

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ~)	DELCO PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L9	.460A	.8Ω	.010 HY	7272827				TC-2		

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	DELCO PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	13	1	7274068			TA-51			

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE	REPLACEMENT DATA							NOTES
	PRI.	DELCO PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	9Ω Tap @ 3-4Ω	1221290							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	DELCO PART No.	QUAM PART No.	
SP1	6"x 9"	PM	3-4Ω	7272810	69A3	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			DELCO PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	7AG	7½A 32V			30707.5 (7AG 7½A 32V)		SFE 7½	

MISCELLANEOUS

ITEM No.	PART NAME	DELCO PART No.	NOTES
M2	Spark Plate	7271574	
M3	Switch	7272909	Sensitivity (Includes Station Selector Bar, R27, R28)
M4	Switch	7268030	Power Solenoid
M5	Switch	7268030	Treadle Solenoid
M6	Switch	7273705	Station Selector
M7	Switch	7273680	Foot Control
M8	Switch	7271425	Speaker Interlock
M9	Relay	7270545	Tuner Operating
M10	Solenoid & Plunger	1221160	Power
M11	Solenoid & Plunger	1221161	Treadle
	Printed Board	7273100	

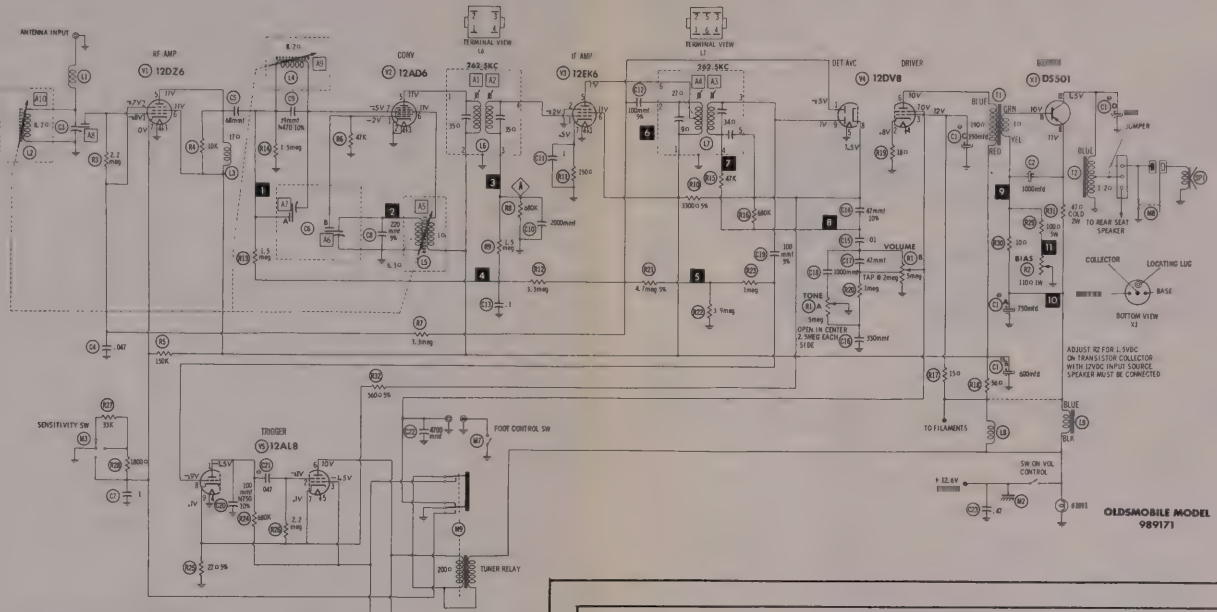
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	575091	Control
Knob	575476	Tone
Knob	575477	Dummy
Pushbutton	7272899	
Pushbutton Ass'y.	1221333	Includes Pushbuttons, Front Bearing Plate & Slides
Pointer Ass'y.	7272851	

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Shielded Hook-up Wire .....Use BELDEN No. 8885
Bonding Strap .....Use BELDEN No. 8661



1 DC voltage measurements taken with vacuum tube voltmeter.
2 Socket connections shown as bottom views.
3 Measured values are from socket pin to common negative.
4 Battery voltage maintained at 12.6 volts for voltage readings.
5 Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6 Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12DZ6	9 meg	7 meg	1.2Ω	0Ω	170Ω	156Ω	0Ω		
V2	12AD6	47K	0Ω	1.2Ω	0Ω	190Ω	156Ω	1meg		
V3	12EK6	680K	0Ω	1.2Ω	0Ω	165Ω	156Ω	150Ω		
V4	12DV8	3 meg	18Ω	115Ω	1.2Ω	0Ω	190Ω	0Ω	500K	750K
V5	12AL5	1MF	2.2meg	1MF	0Ω	1.2Ω		27Ω	4meg	27Ω

TRANSISTOR CIRCUIT RESISTANCE NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE

† MEASURED FROM POSITIVE TERMINAL OF C1A.

⊛ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE®

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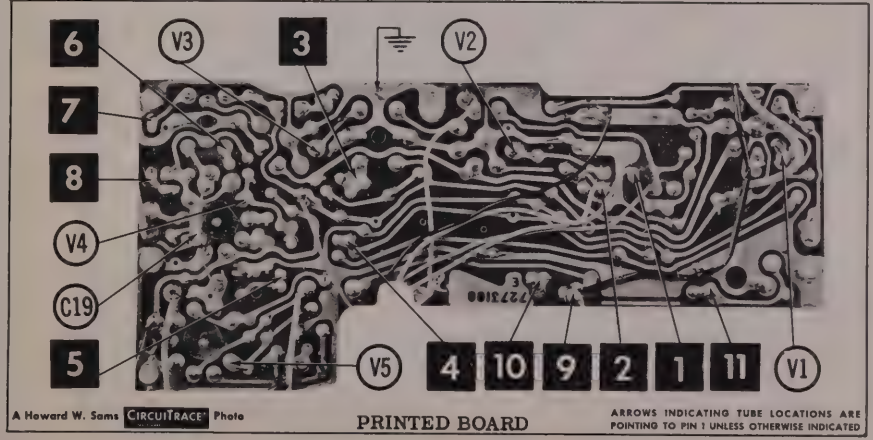

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PRINTED BOARD

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED

PHOTOFACT* Folder

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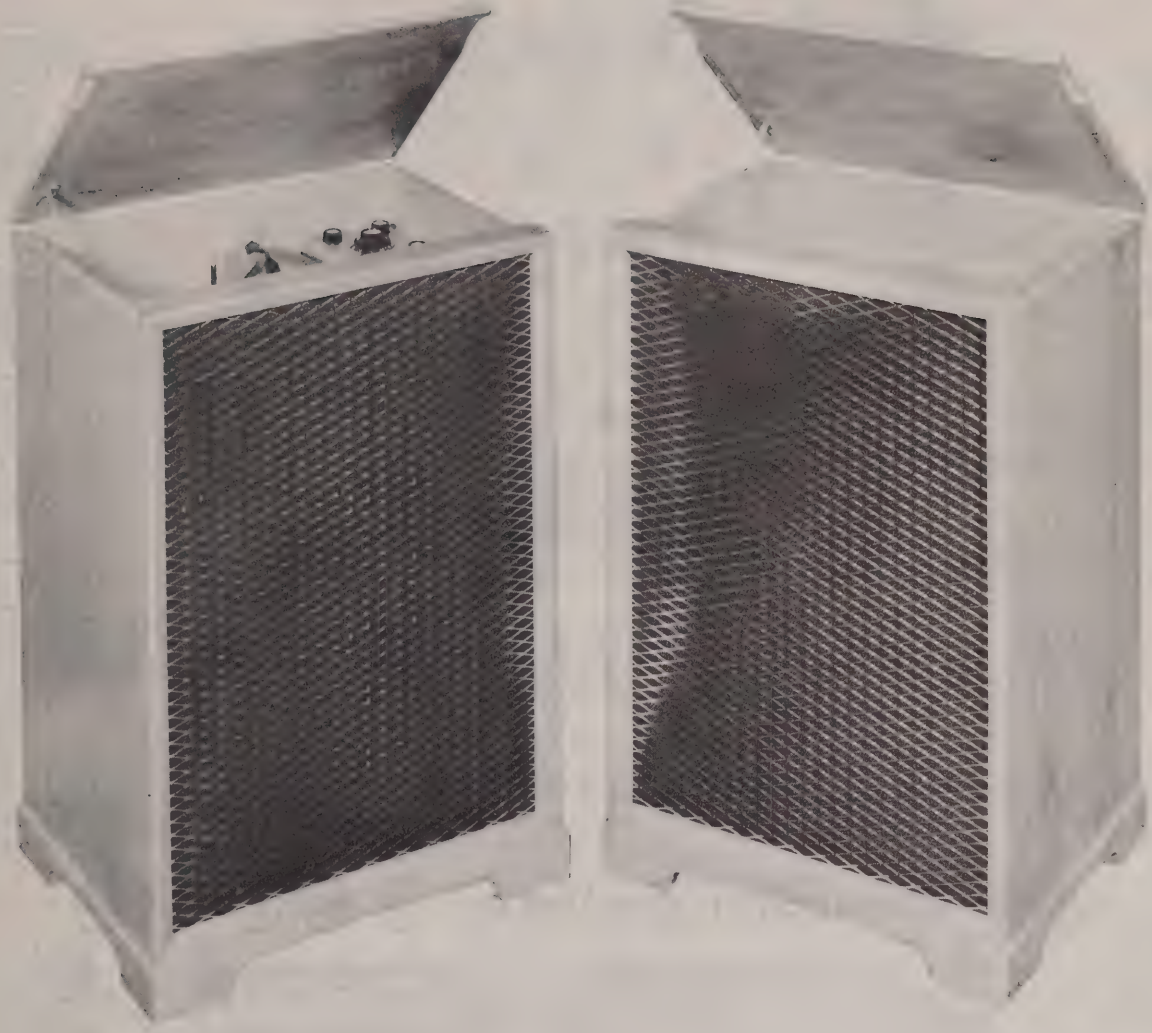
SETCHELL-CARLSON MODEL RP91 (Ch. H-60, J-60, RP-90)

SETCHELL-CARLSON MODEL
RP91 (Ch. H-60, J-60, RP-90)



SETCHELL-CARLSON MODEL
RP91 (Ch. H-60, J-60, RP-90)

TRADE NAME	Setchell-Carlson Model RP-91 (J-60 FM Tuner, H-60 AM Tuner, RP90 Amp)		
MANUFACTURER	Setchell-Carlson Inc., New Brighton, St. Paul 12, Minn.		
TYPE SET	AC Operated FM-AM Receiver And Stereo Amplifier With 4 Speed Automatic Record Changer		
TUBES	FM Tuner: Four AM Tuner: Three Amplifier: Six		
POWER SUPPLY	110-120 Volts AC, 60 Cycles	RATING	75 Watts, .8 Amp. @117 Volts AC (Radio)
TUNING RANGE—BROADCAST	535—1600KC	FREQ. MOD.	88—108

FOR SERVICE INFORMATION ON RECORD CHANGER — SEE SIMILAR V-M 1200A — PHOTOFACT SET 353 FOLDER 16
OR RECORD CHANGER MANUAL RC-10

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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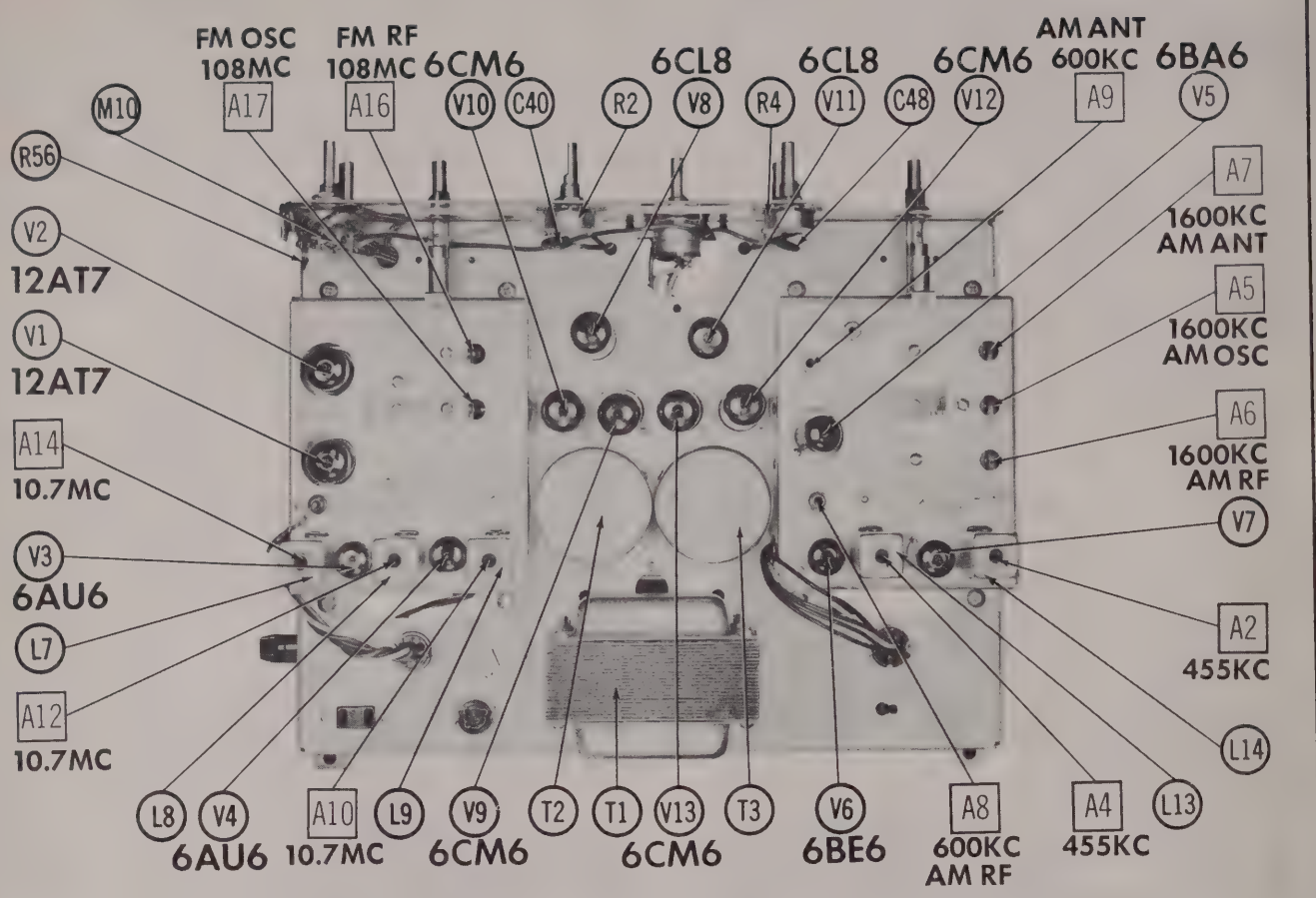
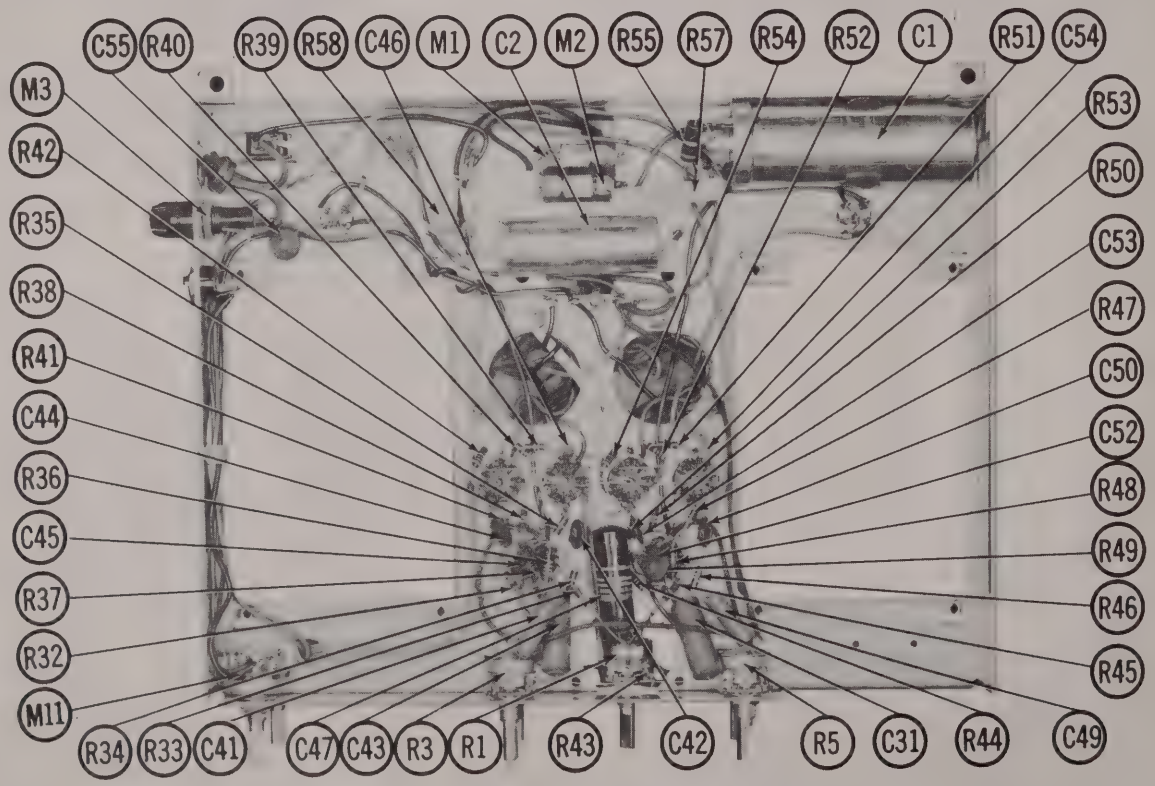
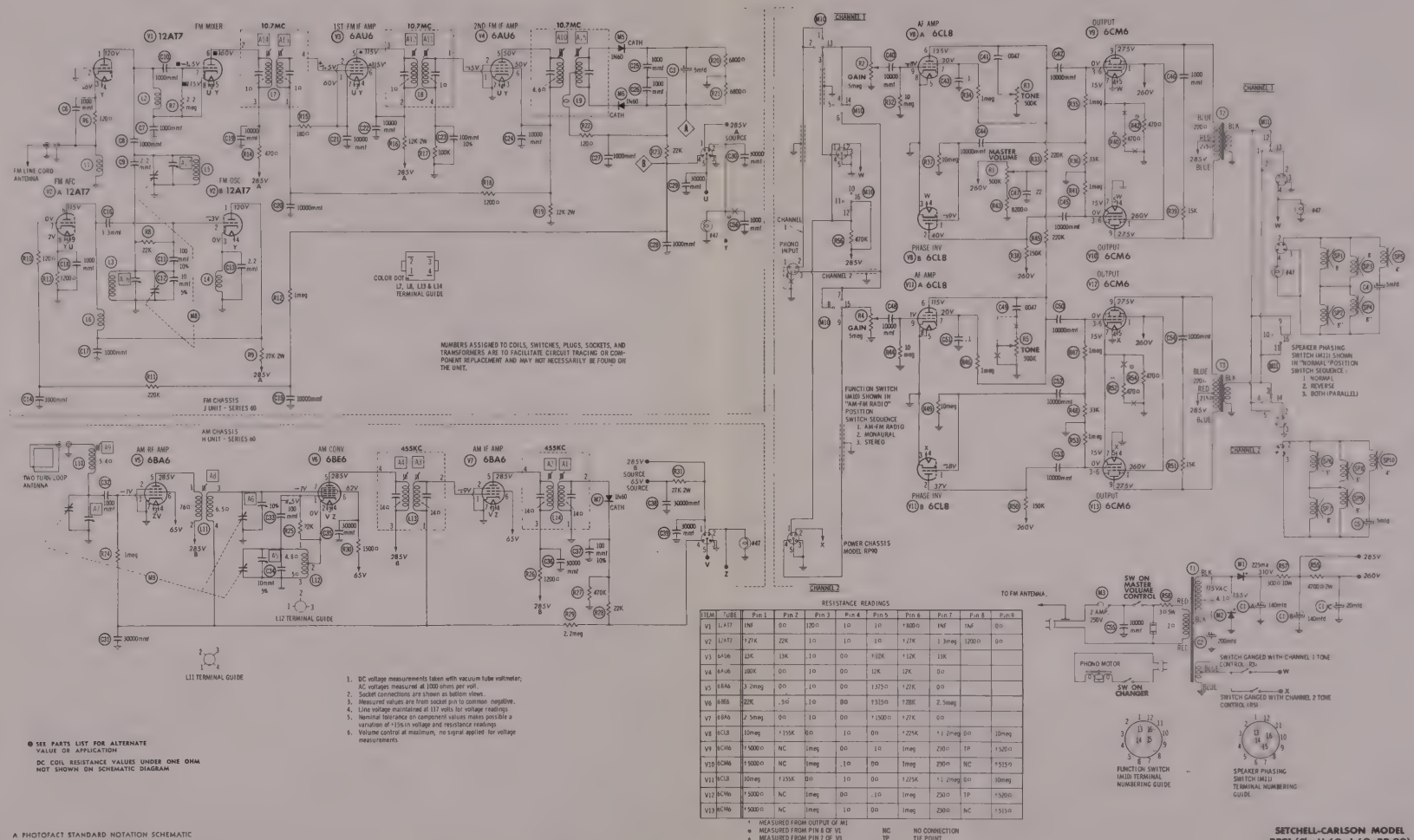
SET 461 FOLDER 14



CHASSIS - TOP VIEW



CHASSIS - BOTTOM VIEW



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AT7	INF	0Ω	120Ω	1Ω	1Ω	*800Ω	INF	INF	0Ω
V2	12AT7	*27K	22K	1Ω	1Ω	1Ω	*27K	1.3meg	1200Ω	0Ω
V3	6AU6	13K	13K	1Ω	0Ω	*12K	*12K	13K		
V4	6AU6	280K	0Ω	1Ω	0Ω	12K	12K	0Ω		
V5	6BA6	1.2meg	0Ω	1Ω	0Ω	*375Ω	*27K	0Ω		
V6	6BE6	22K	.5Ω	1Ω	0Ω	*315Ω	*28K	2.5meg		
V7	6BA6	1.2meg	0Ω	1Ω	0Ω	*150Ω	*27K	0Ω		
V8	6CL8	10meg	*135K	0Ω	1Ω	0Ω	*225K	*1.2meg	0Ω	10meg
V9	6CM6	*500Ω	NC	1meg	0Ω	1Ω	1meg	230Ω	TP	*520Ω
V10	6CM6	*500Ω	NC	1meg	1Ω	0Ω	1meg	230Ω	NC	*515Ω
V11	6CL8	10meg	*135K	0Ω	1Ω	0Ω	*225K	*1.2meg	0Ω	10meg
V12	6CM6	*500Ω	NC	1meg	0Ω	1Ω	1meg	230Ω	TP	*520Ω
V13	6CM6	*500Ω	NC	1meg	1Ω	0Ω	1meg	230Ω	NC	*515Ω

* MEASURED FROM OUTPUT OF M1
● MEASURED FROM PIN 8 OF V1
▲ MEASURED FROM PIN 7 OF V3

NC NO CONNECTION
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings
6. Volume control at maximum, no signal applied for voltage measurements

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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SETCHELL-CARLSON MODEL RP91 (Ch. H-60, J-60, RP-90)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.
Suggested alignment tools: A1 thru A4, A8 thru A15.....GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545
A5, A6, A7, A16, A17.....GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05mfd	High side to pin 7 (grid) of AM Converter. Low side to chassis.	455KC (400∿ Mod.)	AM	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	1600KC	"	"	"	A5, A6, A7	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	600KC	"	600KC	"	A8, A9	Adjust for maximum output. Repeat Steps 2 and 3.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Use only enough generator output to provide a usable indication on VTVM.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.001mfd	High side to pin 7 (grid) of FM Mixer. Low side to chassis.	10.7MC (Unmod.)	FM	Point of non-interference	DC probe to point Ⓐ. Common to chassis.	A10, A11, A12, A13, A14	Adjust for maximum deflection.
5.	"	"	"	"	"	DC probe to point Ⓑ. Common to chassis.	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.001mfd	High side to pin 7 (grid) of FM Mixer. Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference.	Vert. amp. to point Ⓐ. Common to chassis.	A10, A11, A12, A13, A14	Disconnect stabilizing capacitor C3. Adjust for maximum gain and symmetry of response similar to Fig. 1 with marker as shown.
5.	"	"	"	"	"	DC probe to point Ⓑ. Low side to chassis.	A15	Reconnect C3. Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A10 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

Use only enough generator output to provide a usable indication on VTVM.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	10mmf	High side to FM antenna terminal. Low side to chassis.	108MC	FM	108MC	DC probe to point Ⓐ. Common to chassis.	A16, A17	Adjust for maximum deflection.

FIG. 1

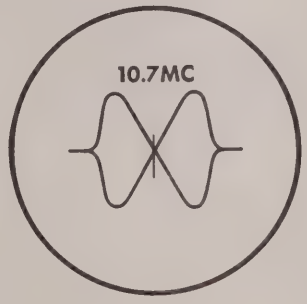
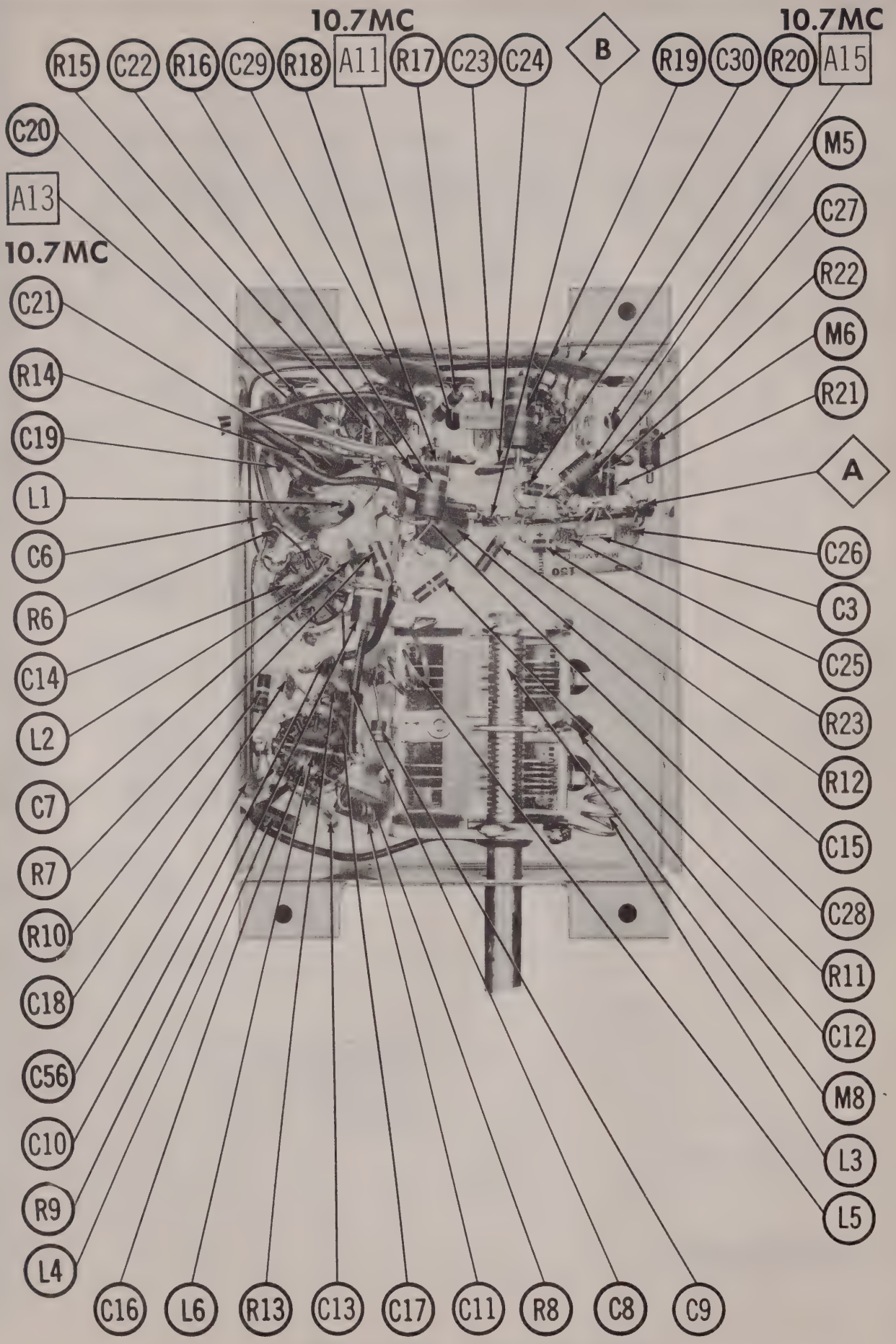


FIG. 2



FM TUNER - BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	FM RF Amp-FM Mixer	12AT7	
V2	FM Osc. -FM AFC	12AT7	
V3	1st FM IF Amp.	6AU6	
V4	2nd FM IF Amp.	6AU6	
V5	AM RF Amplifier	6BA6	
V6	AM Converter	6BE6	
V7	AM IF Amplifier	6BA6	

ITEM No.	USE	TYPE	NOTES
V8	Channel #1 AF Amp. - Channel #1 Phase Inv.	6CL8	
V9	Channel #1 Output	6CM6	
V10	Channel #1 Output	6CM6	
V11	Channel #2 AF Amp. - Channel #2 Phase Inv.	6CL8	
V12	Channel #2 Output	6CM6	
V13	Channel #2 Output	6CM6	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA Setchell - Carlson PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲140	350		AFH3-29-98	D0046			TVLS-3648 *	
B	▲140	350			BR10035				
C	20	350							
C2	200	200		PR1-075	BR20025	WS342	TD-200-200	TVA-1480	
C3	5	150		SRE150V5	BBR4-150	TT150X5	TD-4-150	TVA-1403	
C4	5	150		SRE150V5	BBR4-150	TT150X5	TD-4-150	TVA-1403	
C5	5	150		SRE150V5	BBR4-150	TT150X5	TD-4-150	TVA-1403	

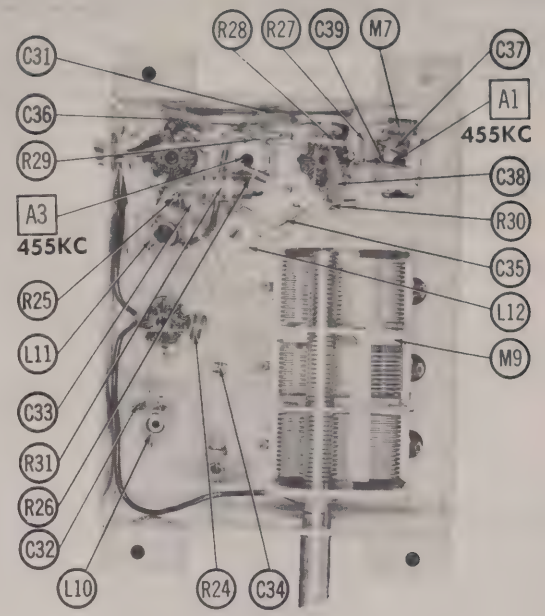
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	RATING TOL	REPLACEMENT DATA Setchell-Carlson PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C6	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C7	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C8	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C9	2.2				NPO-SI 2.2	TCZ-2R2	C10V22C	CNO-522	5TCCB-V22	
C10	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C11	100		10%		1469-0001	D6-101	22R5T1	MCB235	MS-31	
C12	10		5%		NPO-SI 10	TCZ-10	C10Q1C	MCE220	MS-41	
C13	2.2				NPO-SI 2.2	TCZ-2R2	C10V22C	CNO-522	5TCCB-V22	
C14	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C15	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C16	3.3				NPO-SI 3.3	TCZ-3R3	L10V33	CNO-533	5TCCB-V33	
C17	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C18	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C19	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C20	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C21	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C22	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C23	100		10%		1469-0001	D6-101	22R5T1	MCB235	MS-31	
C24	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C25	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C26	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C27	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C28	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C29	30000				BPD-03	DF-303	BYB6S3	GEM-613	5HK-S3	
C30	30000				BPD-03	DF-303	BYB6S3	GEM-613	5HK-S3	
C31	30000				BPD-03	DF-303	BYB6S3	GEM-613	5HK-S3	
C32	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C33	100		10%		1469-0001	D6-101	22R5T1	MCB235	MS-31	
C34	10		5%		NPO-SI 10	TCZ-10	C10Q1C	MCE220	MS-41	
C35	30000				BPD-03	DF-303	BYB6S3	GEM-613	5HK-S3	
C36	30000				BPD-03	DF-303	BYB6S3	GEM-613	5HK-S3	
C37	100		10%		1469-0001	D6-101	22R5T1	MCB235	MS-31	
C38	30000				BPD-03	DF-303	BYB6S3	GEM-613	5HK-S3	
C39	30000				BPD-03	DF-303	BYB6S3	GEM-613	5HK-S3	
C40	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C41	.0047	400			P488N-0047	D6-472	CUB6D47	GEM-6247	6TM-D47	
C42	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C43	.1	400			P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	
C44	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C45	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C46	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C47	.22	400			P488N-22		CUB4P22	GEM-4022	4TM-P22	

AM TUNER-BOTTOM VIEW



CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	RATING TOL	REPLACEMENT DATA Setchell-Carlson PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C48	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C49	.0047	400			P488N-0047	D6-472	CUB6D47	GEM-6247	6TM-D47	
C50	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C51	.1	400			P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	
C52	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C53	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C54	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	
C55	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C56	1000				BPD-001	DD-102	BYA10D1M	B-210	5HK-D1	①

① Not used in some versions.

CONTROLS

ITEM No.	RATING RESIST-ANCE	RATING WATTS	REPLACEMENT DATA Setchell-Carlson PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500K	½	816	B-60	A47-500K-Z	Q13-133	U48	Master Volume
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			KR-1	SWE-12	76-1	US-26	Off-On
R2A	5meg	½	817	B-88	A47-5meg-Z	Q13-141	U65	Gain, Channel 1
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R3A	500K	½	816	B-60	A47-500K-Z	Q13-133	U48	Tone, Channel 1
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			KR-1	SWE-12	76-1	US-26	Channel 1 Filaments
R4A	5meg	½	817	B-88	A47-5meg-Z	Q13-141	U65	Gain, Channel 2
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R5A	500K	½	816	B-60	A47-500K-Z	Q13-133	U48	Tone, Channel 2
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			KR-1	SWE-12	76-1	US-26	Channel 2 Filaments

PARTS LIST & DESCRIPTION (continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	Setchell-Carlson PART No.	NOTES
R6	120Ω			
R7	2.2meg			
R8	22K			
R9	27K	2		
R10	120Ω			
R11	220K			
R12	1meg			
R13	1200Ω			
R14	470Ω			
R15	180Ω			
R16	12K	2		
R17	100K			
R18	1200Ω			
R19	12K	2		
R20	6800Ω			
R21	6800Ω			
R22	120Ω			
R23	22K			
R24	1meg			
R25	22K			
R26	1200Ω			
R27	470K			
R28	22K			
R29	2.2meg			
R30	1500Ω			
R31	27K	2		
R32	10meg			
R33	220K			
R34	1meg			
R35	1meg			
R36	33K			
R37	10meg			
R38	150K			
R39	15K			
R40	470Ω			Note 1
R41	1meg			
R42	470Ω			Note 1
R43	8200Ω			
R44	10meg			
R45	220K			
R46	1meg			
R47	1meg			
R48	33K			
R49	10meg			
R50	150K			
R51	15K			
R52	470Ω			Note 1
R53	1meg			
R54	470Ω			Note 1
R55	4700Ω	2		
R56	470K			
R57	300Ω	10		
R58	3Ω	5		

Note 1. Some versions may use 220Ω to replace R40 & R42 or R52 & R54.

COILS (RF-IF)

ITEM No.	USE	Setchell-Carlson PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Cathode Choke							2.9uh
L2	RF Choke							12uh
L3	FM RF Coil							
L4	Cathode Choke							2.9uh
L5	FM Osc. Coil							12uh
L6	RF Choke							
L7	1st FM IF Trans.		16-3487	16-3487	FM-254	1463		
L8	2nd FM IF Trans.		16-3487	16-3487	FM-254	1463		
L9	Ratio Detector		17-3498	17-3498	FM-255	1465		
L10	AM Ant. Coil							
L11	AM RF Coil							
L12	AM Osc. Coil							
L13	1st AM IF Trans.		16-6758	16-6758	BC-352	12-C1	RF-1	
L14	2nd AM IF Trans.		16-6758	16-6758	BC-353	12-C2	RF-2	

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	Setchell-Carlson PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V@ .9A	115V@ .58A	6.3V@ 5.2A	TM1018A						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	Setchell-Carlson PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	7200Ω CT	3-4Ω	TM1085	22S47①	A-2900①	AU-608①	A-3850①	22S47①	S-53X①	① Drill new mounting holes
T3	7200Ω CT	3-4Ω	TM1085	22S47①	A-2900①	AU-608①	A-3850①	22S47①	S-53X①	

SPEAKER

ITEM No.	TYPE SIZE	TYPE FIELD	TYPE V. C. IMP.	Setchell-Carlson PART No.	QUAM PART No.	NOTES
SP1	8"	PM	3-4Ω		8A31	
SP2	8"	PM	3-4Ω		8A31	
SP3	8"	PM	3-4Ω		8A31	
SP4	8"	PM	3-4Ω		8A31	
SP5	4"	PM	3-4Ω		4A1	
SP6	8"	PM	3-4Ω		8A31	
SP7	8"	PM	3-4Ω		8A31	
SP8	8"	PM	3-4Ω		8A31	
SP9	8"	PM	3-4Ω		8A31	
SP10	4"	PM	3-4Ω		4A1	

RECTIFIERS

ITEM No.	RATING CURRENT (Measured)	Setchell-Carlson PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	NOTES
M1	.225A	①	HA504①	5E4 ①	M500①		① Silicon Type
M2	.225A	①	HA504①	5E4①	M500①		

FUSES

ITEM No.	TYPE	RATING	Setchell-Carlson PART No. FUSE	Setchell-Carlson PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M3	3AG	2A 250V			312003 (3AG 2A 250V)	342012	AGC 3	HKP

PHONO CARTRIDGE

ITEM No.	Setchell-Carlson PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. NEEDLE	JENSEN PART No. CARTRIDGE	JENSEN PART No. NEEDLE	REMARKS
M4		13T *						* Includes needle

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	Setchell-Carlson PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
M5	1N60		1N60	1N60	1N60	Ratio Det. (Pigtail)
M6	1N60		1N60	1N60	1N60	Ratio Det. (Pigtail)
M7	1N60		1N60	1N60	1N60	AM Det. (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	Setchell-Carlson PART No.	NOTES
M8	Tuning Cap		FM 2 Gang
M9	Tuning Cap		AM 3 Gang (Ant. 30-470mmf, RF 30-475mmf, Osc. 32-190mmf)
M10	Switch		Function, (Monaural-AM-FM-Stereo) (Rotary, 4 Pole)
M11	Switch		Speaker, (Normal-Reverse-Both) (Rotary, 4 Pole)

WIRING DATA

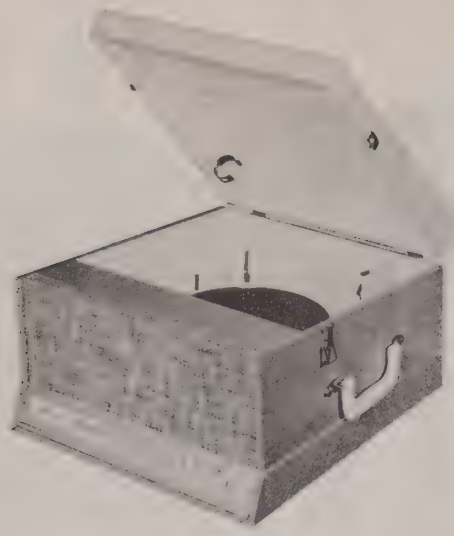
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

PHOTOFACT* Folder

EIA MEMBER

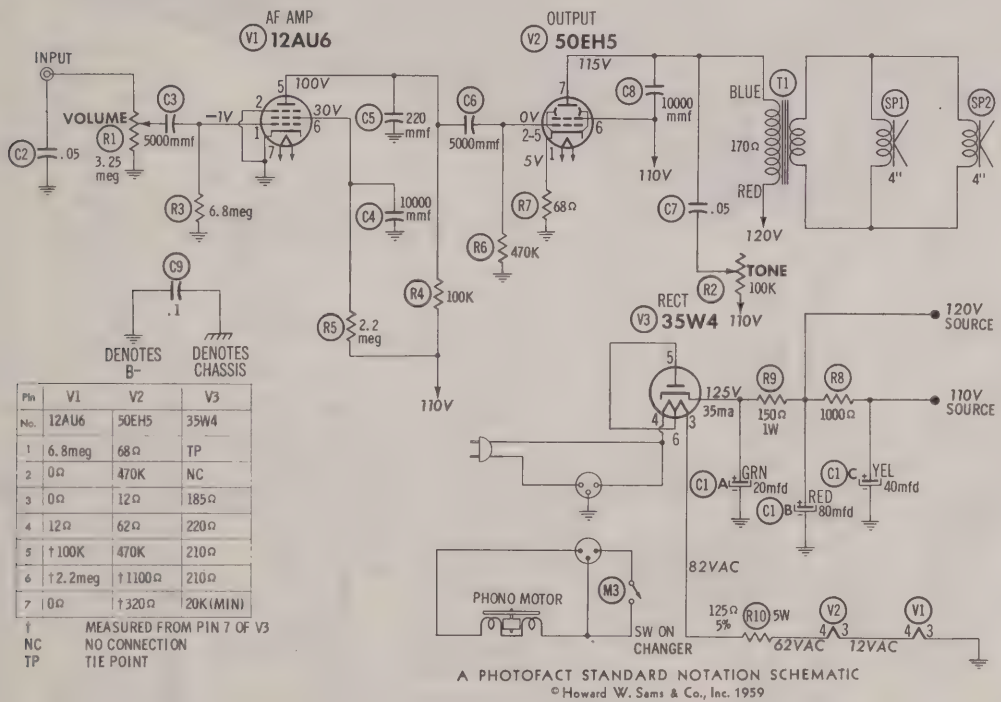
SYLVANIA MODEL 4416 (Ch. 1-640-1)

SYLVANIA MODEL
4416 (Ch. 1-640-1)



TRADE NAME	Sylvania Model 4416 (Ch. 1-640-1)
MANUFACTURER	Sylvania Home Electronics, Div. of Sylvania Electric Products, Inc., 700 Ellicott St., Batavia, N. Y.
TYPE SET	AC Operated 3 Tube Phono Amplifier With 4 Speed Automatic Record Changer
POWER SUPPLY	110-120 Volts AC, 60 Cycles RATING 22 Watts, .25 Amp. @117 Volts AC (Less Motor)

FOR SERVICE INFORMATION ON RECORD CHANGER — SEE SIMILAR V-M 959 — PHOTOFACT SET 396 FOLDER 13



Pin No.	V1	V2	V3
1	6.8meg	68Ω	TP
2	0Ω	470K	NC
3	0Ω	12Ω	185Ω
4	12Ω	62Ω	220Ω
5	†100K	470K	210Ω
6	†2.2meg	†1100Ω	210Ω
7	0Ω	†320Ω	20K(MIN)

† MEASURED FROM PIN 7 OF V3
NC NO CONNECTION
TP TIE POINT

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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SYLVANIA MODEL
4416 (Ch. 1-640-1)

SET 461 FOLDER 15

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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JS265

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	AF Amplifier	12AU6	V3	Rectifier	35W4
V2	Output	50EH5			

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP. ♦	VOLT.	SYLVANIA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	20	150		PRS150V804 020	BBRT84215	TCT3117	TDLT-7	TVA-3455	
B	80	150							
C	40	150							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING			REPLACEMENT DATA						NOTES
	CAP.	VOLT	TOL	SYLVANIA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	.05	400			P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C3	5000				BPD-005	DD-502	BYA10D5	B-250	5HK-D5	
C4	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C5	220				BPD-00022	DD-221	L10T22	B-322	5GA-T22	
C6	5000				BPD-005	DD-502	BYA10D5	B-250	5HK-D5	
C7	.05	400			P488N-05	DF-503	CUB4S5	GEM-415	4TM-S5	
C8	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C9	.1	400			P488N-1	DF-104	CUB4P1	GEM-401	4TM-P1	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	SYLVANIA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	3.25meg	½	360320	B-85	A47-3meg-Z	Q13-140	U57	Volume
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R2A	100K	½	360250	B-41	A47-100K-Z	Q13-128	U39	Tone
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R3	6.8meg	
R4	100K	
R5	2.2meg	

ITEM No.	RATING	REMARKS
R6	470K	
R7	68Ω	
R8	1000Ω	

ITEM No.	RATING	REMARKS
R9	150Ω 1W	
R10	125Ω 5% 5W	

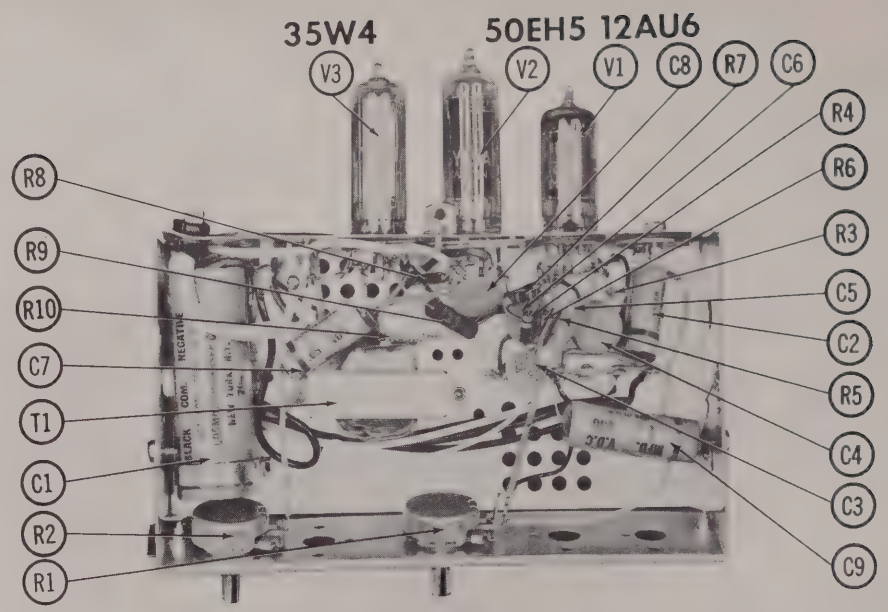
TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	SYLVANIA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2700Ω	1-2Ω	430211	24S51	A-2930	AU-601	A-3877	24S51	S-3X	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	SYLVANIA PART No.	QUAM PART No.	
SP1	4"	PM	4-5Ω		4A1	
SP2	4"	PM	4-5Ω		4A1	

CHASSIS BOTTOM VIEW



PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA							REMARKS
	SYLVANIA PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		JENSEN PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	
M1		13TB *						* Includes needle & mounting mechanism

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS
	SYLVANIA PART No.	JENSEN PART No.	WALCO PART No.	
M2	(78 RPM)	E98 † or E98D ♦	* W-101STS † or * W-101STD ♦ or * W-102S †	* Includes Cartridge † Jewel ♦ Diamond
	(LP)	E98X † or E98XD ♦		

MISCELLANEOUS

ITEM No.	PART NAME	SYLVANIA PART No.	NOTES
M3	Switch		Off-On Reject (On Record Changer)

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No. 8401
Phono Pick-up Arm Cable	Use BELDEN No. 8430 (Two Conductor - Twisted)

PHOTOFACT* Folder with CIRCUITRACE*

WESTINGHOUSE MODELS HS-134, HS-135 (Ch. V-2503-4)

WESTINGHOUSE MODELS
HS-134, HS-135 (Ch. V-2503-4)

MODEL HS-134

WESTINGHOUSE MODELS
HS-134, HS-135 (Ch. V-2503-4)

TRADE NAME	Westinghouse Models HS-134, HS-135 (Ch. V-2503-4)
MANUFACTURER	Westinghouse Electric Corp., TV-Radio Div., Metuchen, N. J.
TYPE SET	AC Operated 4 Tube Audio Amplifier
POWER SUPPLY	110 - 120 Volts AC, 60 Cycles RATING 40 Watts, .48 Amp. @117 Volts AC

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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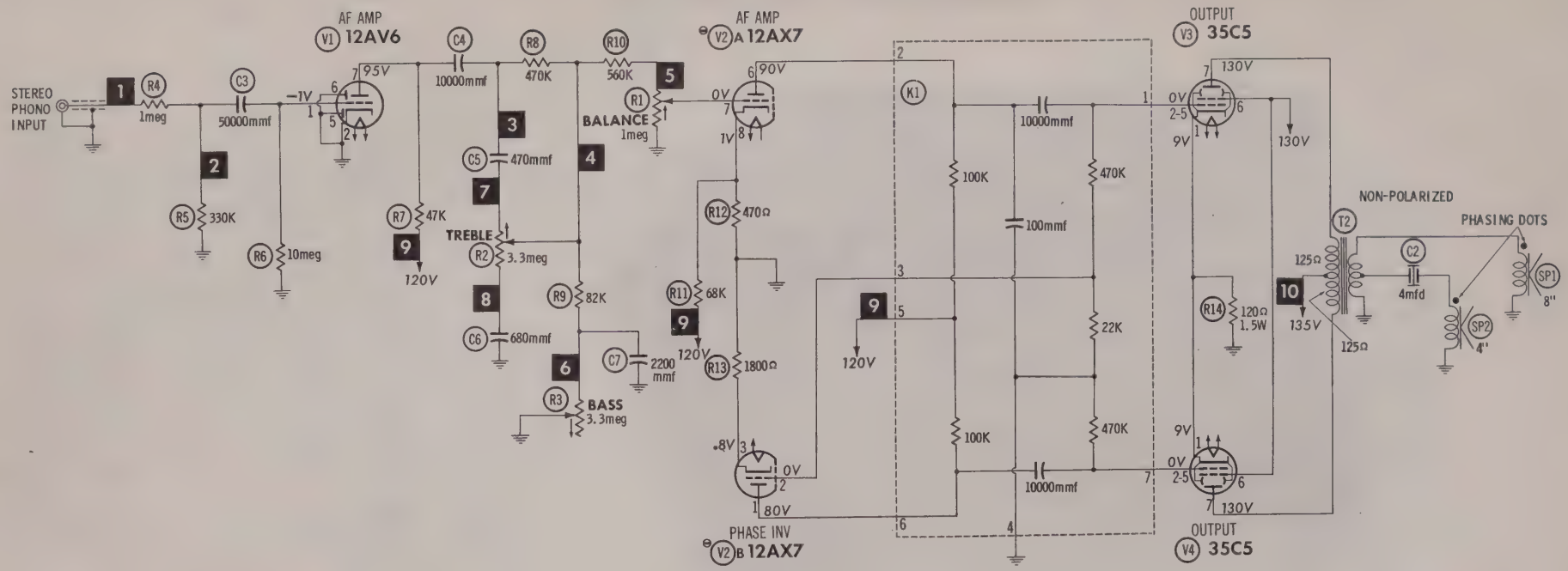
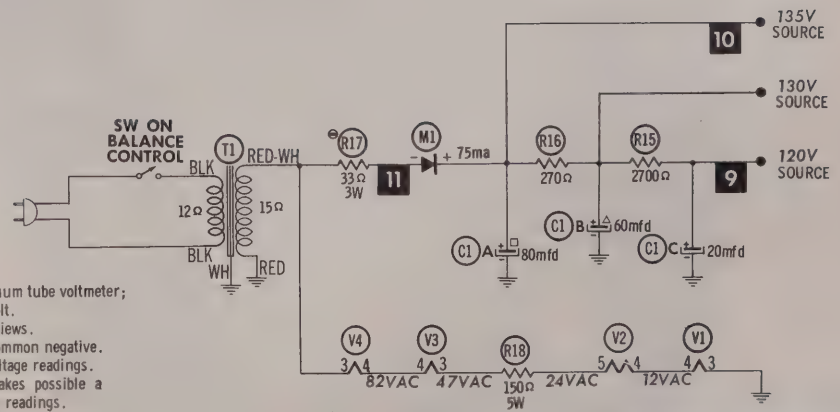


RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AV6	10meg	0Ω	0Ω	12Ω	0Ω	0Ω	†50K		
V2	12AX7	†100K	22K	1800Ω	12Ω	24Ω	†100K	0Ω	470Ω	18Ω
V3	35C5	120Ω	490K	175Ω	210Ω	490K	†270Ω	†125Ω		
V4	35C5	120Ω	470K	245Ω	210Ω	470K	†270Ω	†125Ω		

† MEASURED FROM OUTPUT OF M1.



Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE®

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WESTINGHOUSE MODELS HS-134, HS-135 (Ch. V-2503-4)

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	AF Amplifier	12AV6	
V2	AF Amp. -Phase Inv.	12AX7	* 7025
V3	Output	35C5	
V4	Output	35C5	

* Alternate

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA Westinghouse PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	■80	150	218V025H17		C0120 ††	PWP311.75		PCLS-3444. 8*	
B	▲60	150							
C	20	150							
C2	4	50NP	218V025H19	NP-PRS50V4	BBR8-150 † BBR8-150	TCN504		TVAS-1302. 5*	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.
† Connect negative leads together.
†† Use printed circuit adapters #55277, 55278.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	RATING TOL	REPLACEMENT DATA Westinghouse PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C3	50000	50		215V303H03	C-80V503AM	DF-503	H-0555	TA-150	TG-S50	
C4	10000			R2CC63Z5Z103P	BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C5	470			R2CC61Y5Y471M	BPD-00047	DD-471	BYA10T47	B-347	5GA-T47	
C6	680			R2CC61Y5Y681M	BPD-00068	DD-681	BYA10T68	B-368	5GA-T68	
C7	2200			R2CC62Y5Y222M	BPD-0022	DD-222	BYA10D22	B-222	5HK-D22	

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA Westinghouse PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1	1meg	½	270V027H10					Balance & Switch
R2	3. 3meg	½	270V027H09					Treble
R3	3. 3meg	½	270V052H03					Bass

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	Westinghouse PART No.	NOTES
R4	1meg		RC20AE105K	
R5	330K		RC20AE334K	
R6	10meg		RC20AE106K	
R7	47K		RC20AE473K	
R8	470K		RC20AE474K	
R9	82K		RC20AE823K	
R10	560K		RC20AE564K	
R11	68K		RC20AE683K	
R12	470Ω		RC20AE471K	
R13	1800Ω		RC20AE182K	
R14	120Ω	1. 5	251V023H19	
R15	2700Ω		RC20AE272K	
R16	270Ω		RC20AE271K	
R17	33Ω	3	251V023H22	Note 1
R18	150Ω	5	251V020H55	

Note 1. Some versions may use 22Ω 3W in this application.

PRINTED BOARD

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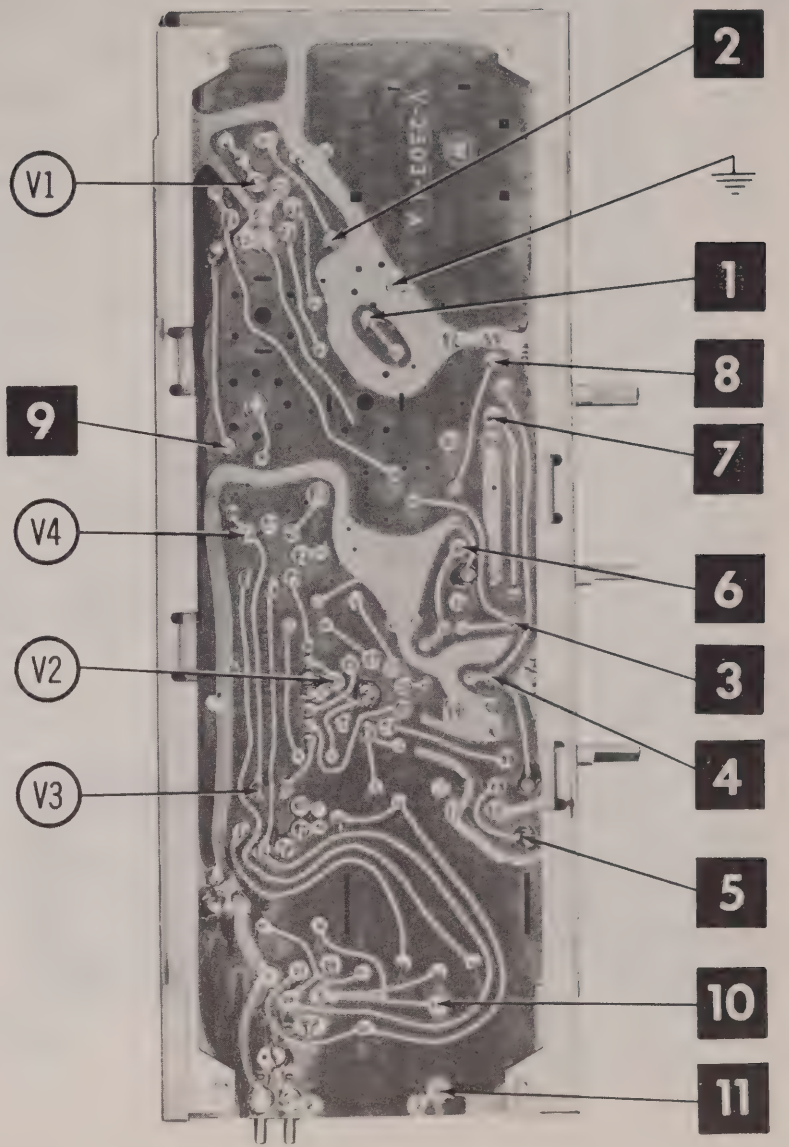
ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



PARTS LIST AND DESCRIPTIONS (Continued)

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Westinghouse PART No.	REPLACEMENT DATA
K1	Audio Coup. Net	100mmf, 10000mmf, 10000mmf, 22K, 100K, 100K, 470K, 470K	219V024H02	

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .48A	117V @ .29A		430V069H01	23V17	P-3096			23V17	N-51X

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	4100Ω CT	16Ω Tap @ 8Ω	430V058H01	24S61	A-2901	AU-600	A-3823	24S61	S-53X	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Westinghouse PART No.	QUAM PART No.	
SP1	8"	PM	14Ω	570V048H01	8A21Z14	
SP2	4"	PM	3-4Ω	570V049H01	4A07	

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	Westinghouse PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.074A	295V012H03①	1235AH① HA154②	T100① SD-94②	100AV① K200②		① Selenium Type ② Silicon Type

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

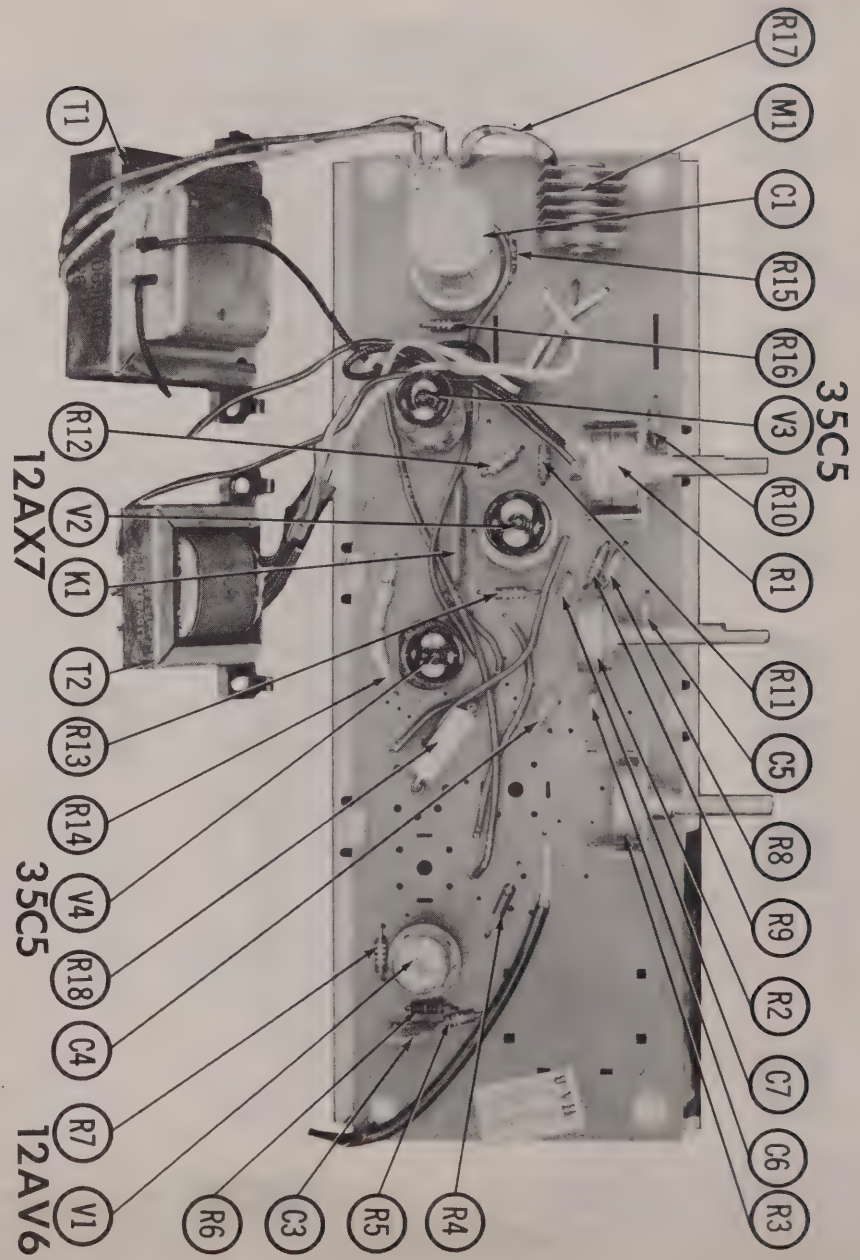
NAME	PART NO.	DESCRIPTION
Knob	550V092H05	Control, 3 Used
Cabinet	516V075H01	Mahogany, Model HS-134
Cabinet	516V075H02	Limed Oak, Model HS-135

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

CHASSIS—TOP VIEW



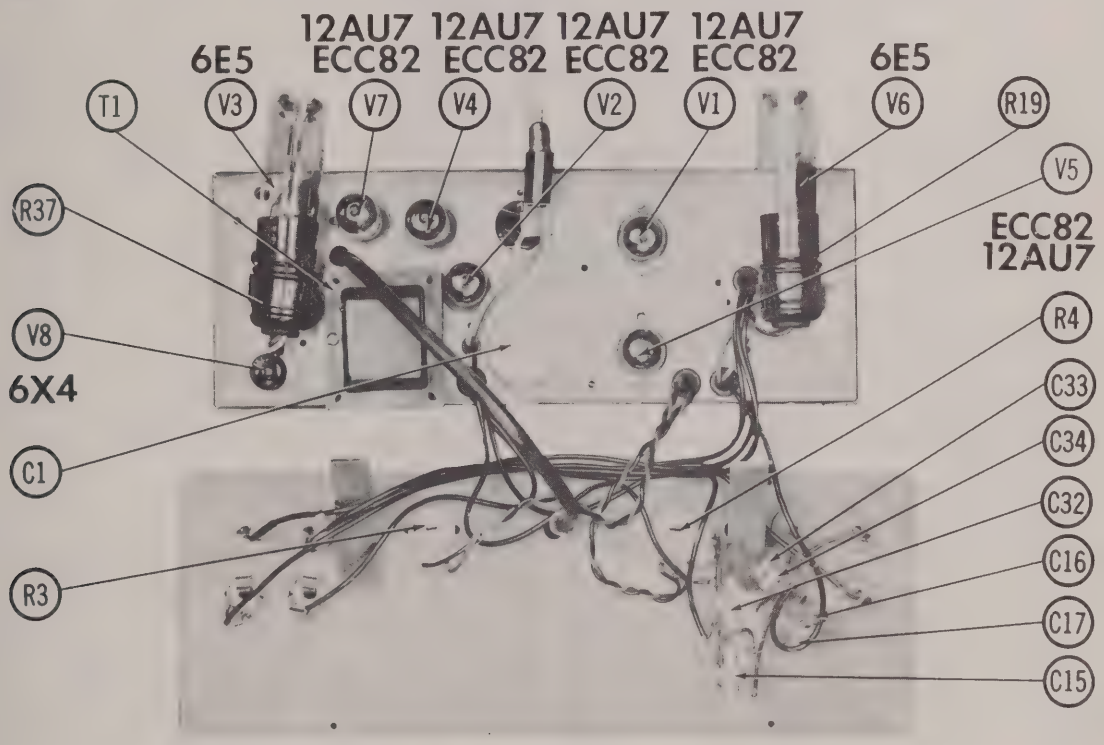
PHOTOFACT* Folder

EIA

WILCOX-GAY
MODEL RA-1-58

WILCOX-GAY
MODEL RA-1-58

TRADE NAME	Wilcox-Gay Model RA-1-58		
MANUFACTURER	Wilcox-Gay Corp., Charlotte, Michigan		
TYPE SET	AC Operated 8 Tube Stereo Recording Amplifier		
POWER SUPPLY	110-120 Volts AC, 60 Cycles	RATING	31 Watts, .33 Amp. @117 Volts AC (Record) 26 Watts, .28 Amp. @117 Volts AC (Stand-by)



WILCOX-GAY
MODEL RA-1-58

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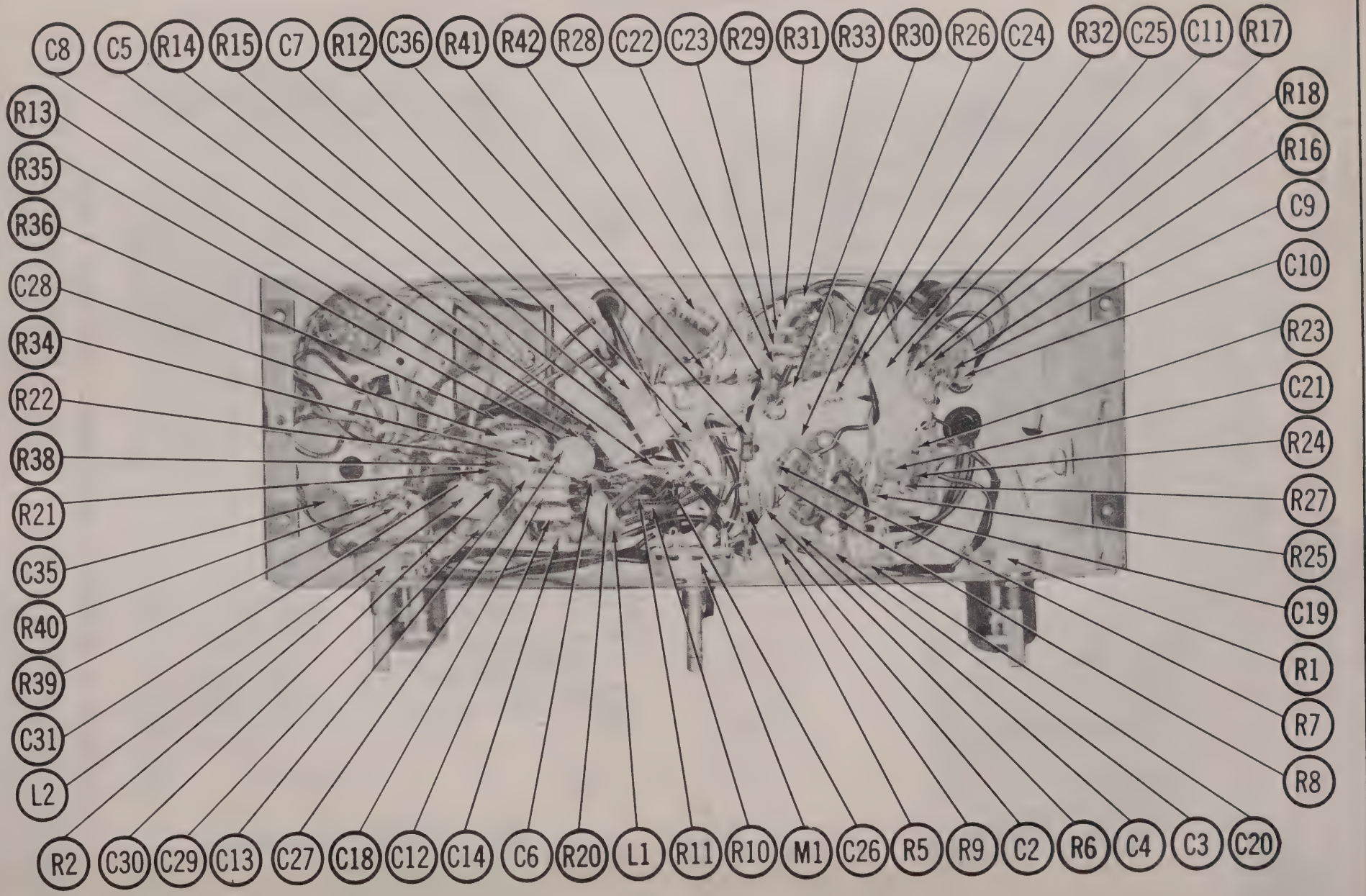
JQ253

SET 461 FOLDER 17



CHASSIS BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE
V1	Right Channel Preamp. - Left Channel Preamp.	ECC82/12AU7
V2	Right Channel AF Amp.	ECC82/12AU7
V3	Right Channel Record Level Indicator	6E5
V4	Right Channel Bias Osc.	ECC82/12AU7
V5	Left Channel AF Amp.	ECC82/12AU7
V6	Left Channel Record Level Indicator	6E5
V7	Left Channel Bias Osc.	ECC82/12AU7
V8	Rectifier	6X4

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA Wilcox-Gay PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲40	450	①	AFH3-44	C0350	FP377	TMT-40	TVL-3787	
B	▲40	450							
C	■40	450							

① Some versions may use 50-100-100mfd in this application.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	RATING TOL	REPLACEMENT DATA Wilcox- Gay PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C3	470				SI 470	D6-471	BYA10T47	UC-5347	5GA-T47	
C4	20000				BPD-02	DD-203	BYB6S2	B-120	5HK-S2	
C5	20000				BPD-02	DD-203	BYB6S2	B-120	5HK-S2	
C6	470				SI 470	D6-471	L10T47	UC-5347	5GA-T47	
C7	.033	400			P488N-033	DF-303	CUB6S33	GEM-4133	4TM-S33	
C8	.047	400			P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C9	50				BPD-00005	DD-500	L10Q5	UC-545	5GA-Q5	
C10	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C11	1500				SI 1500	D6-152	BYA10D15	UC-5215	5HK-D15	
C12	470		10%		1464-00047	D6-471	22R5T47		MS-347	
C13	470		10%		1464-00047	D6-471	22R5T47		MS-347	
C14	1000		10%		1464-001		1R5D1	MCB251	MS-21	
C15	10-160									
C16	220		10%		1464-00022	D6-221	22R5T22		MS-322	
C17	330		10%		1464-00033	D6-331	22R5T33		MS-333	Note 1
C18	470		10%		1464-00047	D6-471	22R5T47		MS-347	
C19	10000				BPD-01	DD-103	BYA10S1	MCB251	5HK-S1	
C20	470				SI 470	DD-471	BYA10T47	UC-5347	5GA-T47	
C21	20000				BPD-02	DD-203	BYB6S2	B-120	5HK-S2	
C22	20000				BPD-02	DD-203	BYB6S2	B-120	5HK-S2	
C23	470				SI 470	D6-471	BYA10T47	UC-5347	5GA-T47	
C24	.033	400			P488N-033	DF-303	CUB6S33	GEM-4133	4TM-S33	
C25	.047	400			P488N-047	DF-503	CUB4S47	GEM-4147	4TM-S47	
C26	50				BPD-00005	DD-500	L10Q5	UC-545	5GA-Q5	
C27	10000				BPD-01	DD-103	BYA10S1	B-110	5HK-S1	
C28	1500				SI 1500	DD-152	BYA10D15	UC-5215	5HK-D15	
C29	470		10%		1464-00047	D6-471	22R5T47		MS-347	
C30	470		10%		1464-00047	D6-471	22R5T47		MS-347	
C31	1000		10%		1464-001		1R5D1	MCB255	MS-21	
C32	10-160									
C33	220		10%		1464-00022	D6-221	22R5T22		MS-322	
C34	330		10%		1464-00033	D6-331	22R5T33		MS-333	Note 1
C35A	4000					DD-402		B-240		Note 2
B	4000				BPD2-004	DD-402	BYC6DD4	B-240	5HK-2D4	Note 2
C36	100				SI 100	D6-101	L10T1	UC-531	5GA-T1	Note 1

Note 1. Not used in some versions.
Note 2. Some versions may use 5000mmf in this application.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA Wilcox-Gay PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1meg	½	11.276	B-70	A47-1meg-Z	Q13-137	U53	Level, Left Chan.
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R2A	1meg	½	11.276	B-70	A47-1meg-Z	Q13-137	U53	Level, Right Chan.
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R3A	500Ω	½	8.240	AB-4	B47-500-S	B11-103	PTA52L	Hum Adjust
B	Shaft			AK-1	Not Req.	SK2	Not Req.	
R4A	500Ω	½	8.240	AB-4	B47-500-S	B11-103	PTA52L	Hum Adjust
B	Shaft			AK-1	Not Req.	SK2	Not Req.	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	Wilcox -Gay PART No.	NOTES
R5	1meg			
R6	2.2meg			
R7	10meg			
R8	220K			
R9	47K			
R10	68K			
R11	2.2meg			
R12	220K			
R13	1000Ω			
R14	10meg			
R15	220K			
R16	100K			
R17	220K			
R18	4.7meg			
R19	1meg			
R20	10K			
R21	10K			
R22	1000Ω			
R23	1meg			

ITEM No.	RATING OHMS	RATING WATT	Wilcox - Gay PART No.	NOTES
R24	2.2meg			
R25	10meg			
R26	220K			
R27	47K			
R28	68K			
R29	2.2meg			
R30	220K			
R31	1000Ω			
R32	10meg			
R33	220K			
R34	100K			
R35	220K			
R36	4.7meg			
R37	1meg			
R38	10K			
R39	10K			
R40	1000Ω			
R41	1000Ω	1		
R42	470Ω	2		

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA Wilcox - Gay PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	Bias Osc.							
L2	Bias Osc.							

TRANSFORMER (POWER)

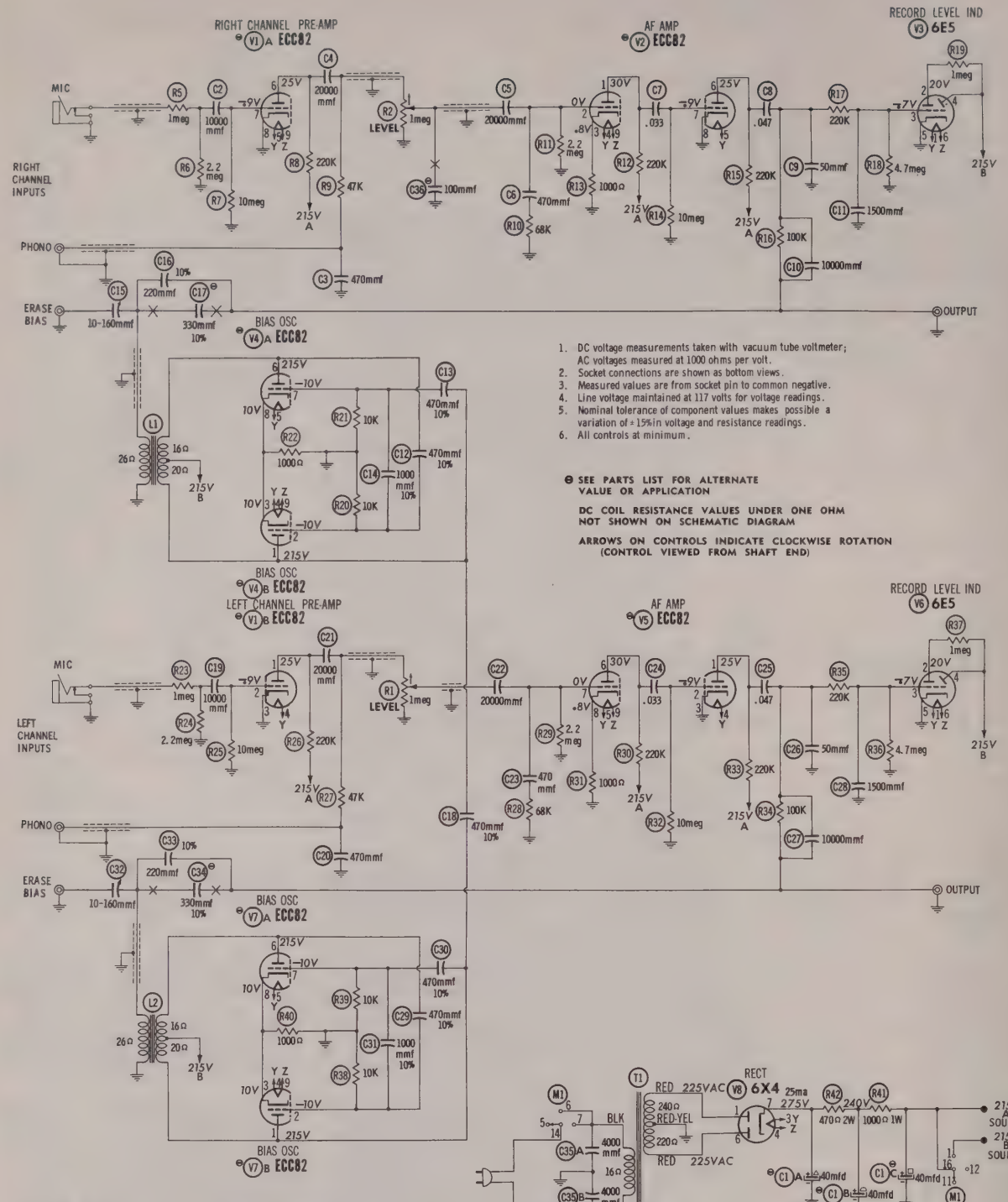
ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA Wilcox - Gay PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V ⓐ .33A	450 VCT ⓐ .025A	6.3V ⓐ 2.7A	C-9.28ID						

MISCELLANEOUS

ITEM No.	PART NAME	Wilcox - Gay PART No.	NOTES
M1	Switch		Selector (Off-Standby-Record)

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC82 12AU7	†220K	10meg	0Ω	130Ω	130Ω	†220K	10meg	0Ω	130Ω
V2	ECC82 12AU7	†220K	2.2meg	1000Ω	130Ω	130Ω	†220K	10meg	0Ω	130Ω
V3	6E5	130Ω	†1meg	4.7meg	†1500Ω	0Ω	130Ω			
V4	ECC82 12AU7	†1500Ω	10K	1000Ω	130Ω	130Ω	†1500Ω	10K	1000Ω	130Ω
V5	ECC82 12AU7	†220K	10meg	0Ω	130Ω	130Ω	†220K	2.2meg	1000Ω	130Ω
V6	6E5	130Ω	†1meg	4.7meg	†1500Ω	0Ω	130Ω			
V7	ECC82 12AU7	†1500Ω	10K	1000Ω	130Ω	130Ω	†1500Ω	10K	1000Ω	130Ω
V8	6X4	240Ω	NC	130Ω	130Ω	NC	220Ω	¶		

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 7 OF V8
NC NO CONNECTION

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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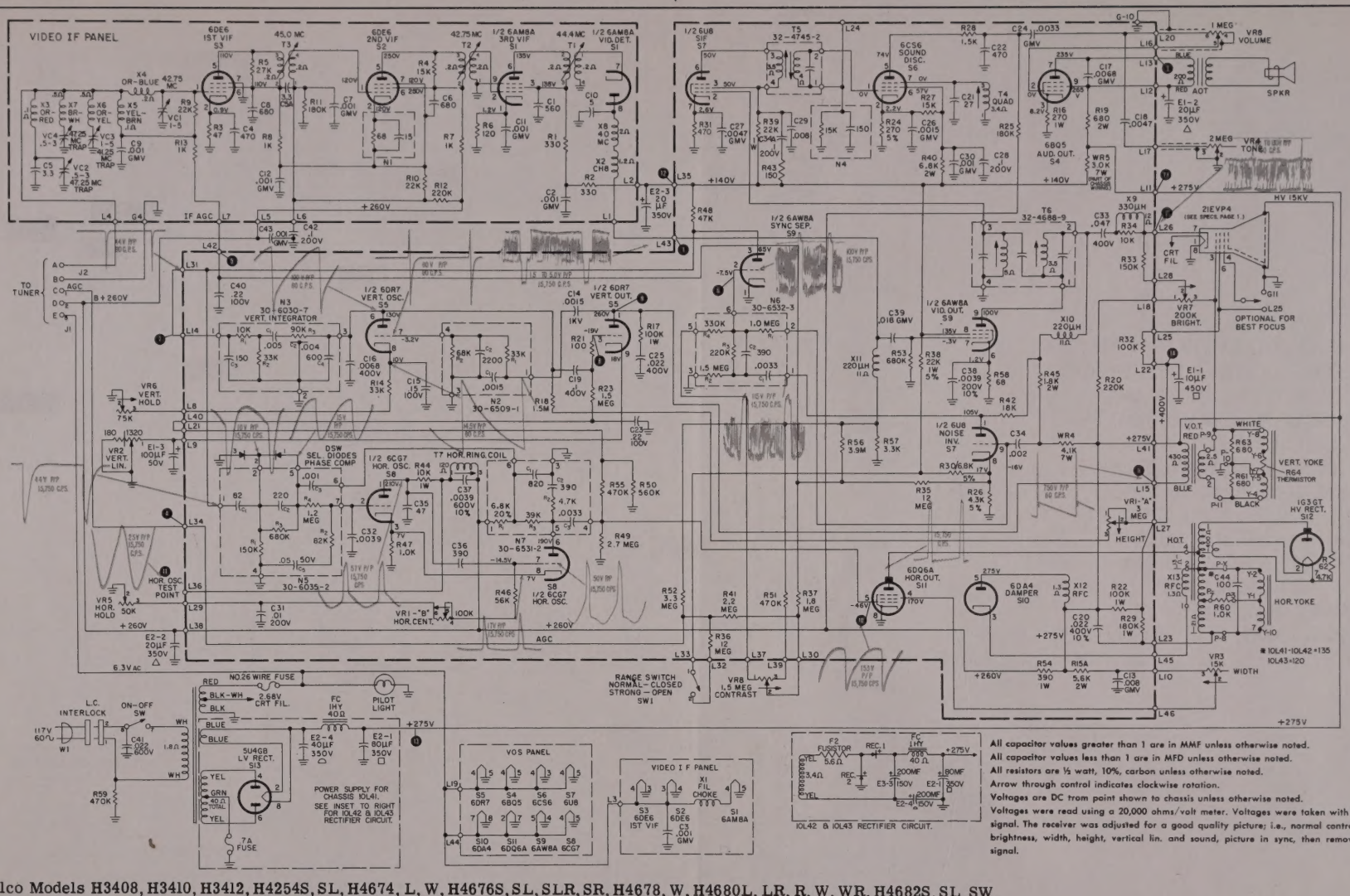
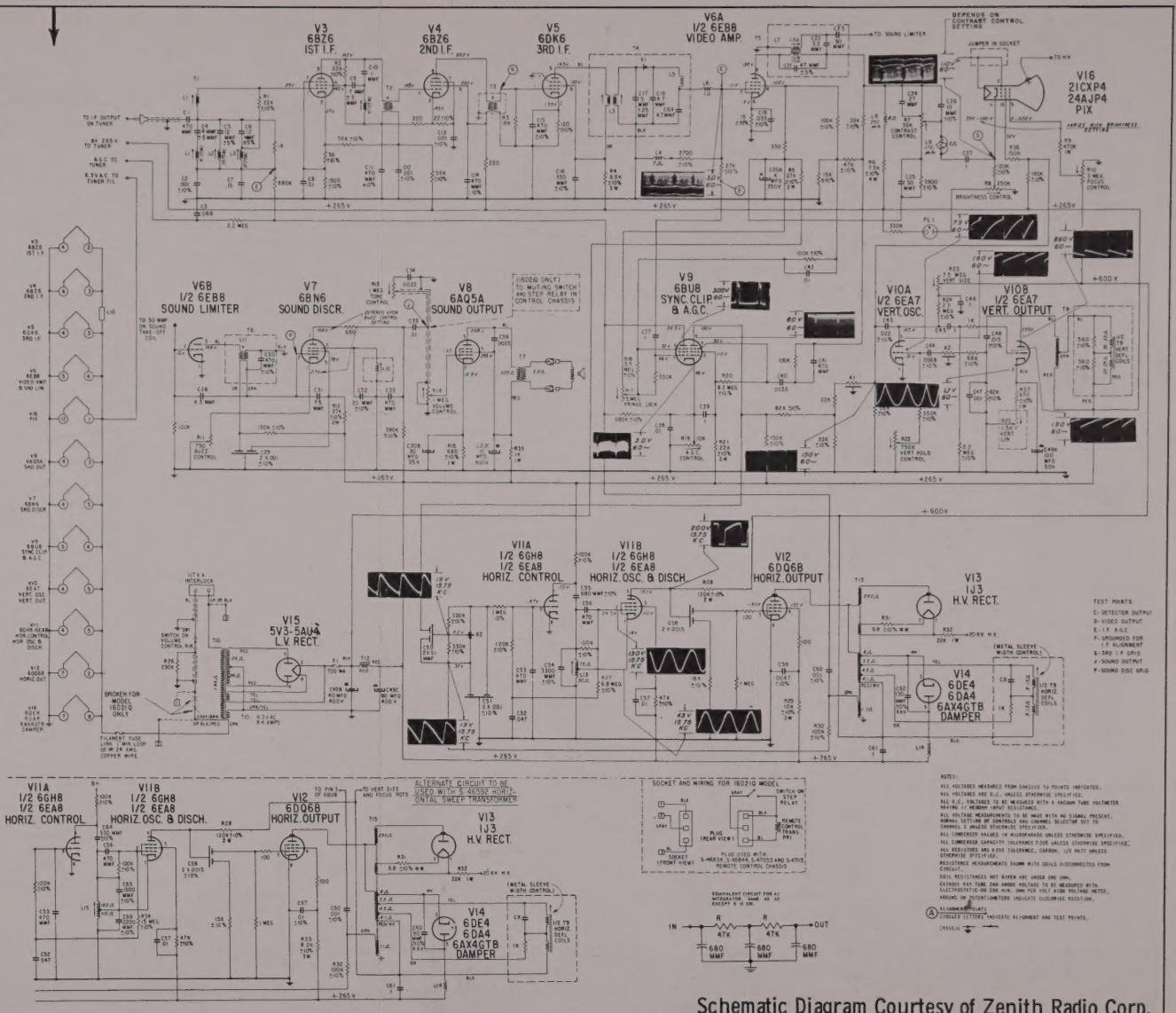
WILCOX-GAY MODEL RA-1-58



Philco Models H3408, H3410, H3412, H4254S, SL, H4674, L, W, H4676S, SL, SLR, SR, H4678, W, H4680L, LR, R, W, WR, H4682S, SL, SW, H4690, P, PR, R, H4692W, H4696R, S, SW, WR, H4698PR, R, H4730, W, H4744, UH3408, UH3410, UH4254S, SL, UH4674, L, W, UH4676S, SL, UH4678, W, UH4680, L, LR, W, UH4682S, SL, SW, UH4690, P, PR, R, UH4692W, UH4696R, S, SW, WR, UH4730, W, UH4744
(Ch. 10L41, 10L42, 10L43)

Schematic Diagram Courtesy of Philco Corp.

Zenith Models D2301R, RU, Y, YU, D2302R, RU, D2315L, LU, D2315R, RU, Y, YU, D2317E, EU, R, RU, W, WU, D2345E, EU, R, RU, W, WU, D2347E, EU, L, LU, M, MU, R, RU, W, WU, D2348E, EU, R, RU, W, WU, D2350H, HU, M, MU, R, RU, W, WU, D2355E, EU, L, LU, R, RU, W, WU, D2381E, EU, R, RU, W, WU, D2384H, HU, R, RU, D2673E, EU, R, RU, W, WU, D3002E, R, W, D3004E, R, W, D3005E, L, M, W, D3006E, L, R, W, D3007E, M, R, W, Y, D3008R, D3009E, W, Y (CH. I6D21, Q, U)


V3 6BZ6 1ST I.F.
V4 6BZ6 2ND I.F.
V5 6DK6 3RD I.F.
V6A 1/2 6EB8 VIDEO AMP.
V16 21CXP4 24AJP4 PIX
V6B 1/2 6EB8 SOUND LIMITER
V7 6BN6 SOUND DISCR.
V8 6AQ5A SOUND OUTPUT
V9 6BU8 SYNC. CLIP & A.G.C.
V10A 1/2 6EA7 VERT. OSC.
V10B 1/2 6EA7 VERT. OUTPUT
V11A 1/2 6GH8 1/2 6EA8 HORIZ. CONTROL
V11B 1/2 6GH8 1/2 6EA8 HORIZ. OSC. & DISCH.
V12 6DQ6B HORIZ. OUTPUT
V13 1J3 H.V. RECT.
V14 6DE4 6DA4 6AX4GTB DAMPER
V15 5V3-5AU4 L.V. RECT.
+265 V
+600 V
ALTERNATE CIRCUIT TO BE USED WITH S-46592 HORIZONTAL SWEEP TRANSFORMER
SOCKET AND WIRING FOR 16D21Q MODEL
SOCKET (FRONT VIEW)
PLUG (REAR VIEW)
REMOTE CONTROL TRANS. PRI
SWITCH ON STEP RELAY
Schematic Diagram Courtesy of Zenith Radio Corp.

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